

A REVISION OF THE AUSTRALIAN BOMBYLIIDAE (DIPTERA). PART i.

By FREDERICK H. S. ROBERTS, M.Sc.

(Four Text-figures.)

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*Introduction.*

The Bombyliidae form a family with well defined limits within the superfamily Asiloidea. While the family has been extensively studied in other parts of the world, in Africa by Bezzi, in India by Brunetti, in Europe by Becker, and in America by Williston and Aldrich, little has been done towards a systematic study of the Australian species. White, in 1916, published descriptions of species occurring in Tasmania, and Hardy in 1921 compiled a catalogue in which he recorded synonyms and made an attempt to place all the described species into definite generic conceptions. In 1923 Hardy published a further paper containing keys found in the unpublished manuscript of White, adding his own notes thereto. These three papers represent the work so far accomplished in arranging the Australian species, and they form a very valuable basis for progressive study.

The original descriptions are to be found in the works of Fabricius, Macquart, Walker, Schiner, Gray, v.d. Wulp, Thomson, Macleay, White and Hardy. Many of the original descriptions given by the earlier authors were based on rubbed or otherwise damaged specimens, making the identification of species somewhat difficult. Until the types, especially of Macquart and Walker, are made available for study, it will always remain doubtful whether the recent identifications made on personal opinions are correct. Most of the specific differences, especially in the larger genera, depend upon colours and pubescence that are easily rubbed off. In specimens that become rubbed, many of the characters are thus destroyed, and the determination of any but good specimens is very difficult, if not impossible. I have endeavoured to find specific differences which do not depend upon colours, but have rarely been successful. I have seen specimens of species that are undoubtedly new that are not yet included in these studies, as either their condition is too poor to warrant a description or too few specimens are available for the purpose.

The material examined consisted of the entire collections of the Queensland Museum, Brisbane; the Australian and Macleay Museums, Sydney; the South Australian Museum, Adelaide; and the Department of Agriculture, Perth. To the authorities of these institutions I wish to express my very grateful thanks. I am also indebted to Mr. G. H. Hardy for the loan of his collection of the family, and for valuable suggestions and advice; to Dr. I. M. Mackerras, the late Dr. E. W. Ferguson, and Messrs. Nicholson, Dodd, Mann, and Smith, for the opportunity afforded to examine their material. I must also thank Major E. Austin of the British Museum, the Director of the South African Museum, and Dr. J. M. Aldrich, of the United States National Museum, Washington, for their kindness in acceding to my requests for exotic material that has enabled me to place certain species in their genera with more certainty than could otherwise have been done.

## Family Bombyliidae.

The head is large, generally as broad as the thorax, sometimes much more so, usually globular or semicircular in shape; the eyes are bare, either separated in both sexes, but wider apart in the female, or contiguous in the male and separated in the female, or contiguous in both sexes; the frons is usually raised between the eyes to be moderately convex, rarely concave; the face, in profile, varies from being sharply convex to retreating, both the face and frons being usually covered with pubescence, rarely bare; the occiput is inflated, bilobate above and with a central cavity, or flattened or concave, not bilobate and without a central cavity; the hind borders of the eyes may be indented and the upper and larger facets may be separated from the lower and smaller facets by a distinct line, called the bisecting line; the ocelli are three in number and are placed in a triangle on a usually prominent tubercle at or close to the head vertex; the antennae are composed of three segments, are porrect, and sometimes much longer than the head; they may arise well apart from each other or may be almost contiguous; the third segment is usually furnished with an apical or subapical spine, an elongate and bristle-like style, or an apical pencil of hairs; the style is either one or two jointed; the proboscis may be short and stout, or very elongate and slender, with soft fleshy labella; the palpi are usually slender, composed of one or two segments.

The thorax is more or less quadrate, broadest behind, flattened or humped, usually provided with pre-sutural, pre- and post-alar bristles, and generally covered with dense hairs and scales, sometimes with scales only, but is very rarely bare; the scutellum is large, semicircular in shape, depressed, and usually furnished with bristles, which are more conspicuous along the hind margin; the squamae are large and frequently fringed with scales or hairs; the halteres are slender and of no great length.

The abdomen consists of six to nine visible segments and is of varying shape, curvature and thickness; it may be flattened and more or less straight sided (*Villa*), oval or rotund (*Bombylius*), decumbent and tubular (*Toxophora*), or very elongate and pedunculate (*Systropus*); it is generally clothed with long hairs and scales, or it may be entirely covered with scales only; the male genitalia are generally hidden, and sometimes set on one side; the genitalia of the female may bear at the apex short blunt spines or dense long hairs.

The legs are usually slender, with the front pair abbreviated and the hind pair very long (in the *Systropinae* they are exceptionally long and strong); the fore legs may be provided with hairs only, or with rather weak spines, which become somewhat more numerous and stronger on the middle and hind legs; the ungues are rather small and may sometimes possess a basal tooth; pulvilli are generally present, but are absent in the Australian species of the *Exoprosopinae*, and in some of the genera of the *Cylleniinae*.

The wings have a characteristic reduced venation, as M never has more than three branches in the Australian species. The median cell is usually closed, but is open in two genera, *Pachyneres* and *Cyrtomorpha*; cell Cu and cell R<sub>5</sub> may be open or closed; cells M<sub>1</sub>, 2nd M<sub>2</sub> and M<sub>4</sub> are always open; R<sub>2+3</sub> may originate from R<sub>4+5</sub> at right angles and close to the vein r-m, or else at an acute angle and at a distance from r-m; R<sub>2+3</sub> is generally looped at its apex, the loop being strongly developed in some of the *Lomatiinae* and *Cylleniinae*; R<sub>4</sub> is also usually curved, but is generally straight in the *Phthiriinae*, and in the *Cyrtosiinae* is missing; the axillary lobe and alula are usually well developed, but in the genera *Docidomyia*

and *Systropus* the lobe is considerably reduced and the alula is entirely wanting. The wings are not usually hyaline, but of various shades and patterns of brown.

*The Adult.*—The adults are all sun-loving flies, usually found in the vicinity of flowers and sometimes rank vegetation. Some are to be found only in more or less arid country, and are flies of low, swift flight, hovering over sandy patches of soil, and frequenting the flowers of low growing shrubs and weeds. Others hover in mid air, the rapid vibrations of the wings producing the humming sound, so characteristic of bees. While still on the wing, these flies are enabled to suck the nectar from the flowers by the aid of their long proboscides. In general, the adults of this family are prettily and delicately marked in various shades of yellow and brown. In some localities they may be seen from mid winter (southern Queensland) to the end of April (north Queensland), but are most abundant from early spring to mid summer.

*The Larva.*—The following quotations are taken from Brunetti: "amphineustic, cylindrical, rather flattened, thirteen segmented; an obvious though small retractile head, with well developed mouth parts, papillate antennae, and no eyes; the young larva is elongate, and each thoracic segment is provided with a pair of long setae, the penultimate segment with two spiracles; the adult larva is obese, and free from setae".

*The Pupa.*—"Pupa free, mummy like, with strong spines on the anterior part; abdominal segments with chitinous hooklets. Pupa has pro-thoracic and seven pairs of abdominal spiracles, some species bearing transverse rows of spines on most of the segments".

*Life Histories.*—Little is known of the life histories of the Australian species, and the addition in this paper of some of the life histories of exotic species may help in elucidating the larval habits of some of our species at a subsequent time. The genus *Hyperalonia* has been recorded as a parasite of a scolid wasp which is parasitic on Scarabaeidae (cane grubs), and also of the larva of an Asilid which also is predaceous on cane grubs. *Villa* has been bred from moths of the family Noctuidae, and *Anthrax* is parasitic on solitary mud building wasps, and also on bees.

A species of *Exoprosopa* occurs in North America as a hyperparasite of the Hymenopteron genus *Tiphia*, which is itself parasitic on the Lamellicorn genus *Lachnosterna*. Species of *Villa* have been bred from Lepidopterous and Hymenopterous larvae and from the egg masses of locusts in Europe and North America; of *Anthrax* from solitary and social Hymenoptera; of *Bombylius* from the nests of small bees, *Andrena*, *Halictus*, etc.; of *Systoechus* from the egg masses of locusts; of *Toxophora* from the nests of the solitary wasps, *Odynerus*, *Pelopoeus*, and *Eumenes*; of *Geron* from the larvae of Lepidoptera. *Systropus* has been recorded in several countries as being a parasite of the family Limacodidae.

The recording of the genera *Bombylius* and *Toxophora* as parasitic on Hymenoptera is very interesting as suggested cases of mimicry. At first sight many Bombyliinae are very similar to bees, as instanced by their popular name "bee flies". The yellow and black *Toxophora* is very similar to some of the yellow and black wasps and is somewhat reminiscent of the Syrphid genus *Ceroides*.

*Classification.*—The Bombyliidae have been regarded as forming one main branch of the superfamily Asiloidea, the Asilidae, Apioceridae, Therevidae, Mydidae, and Scenopinidae, the other branch. Linnaeus was the first to recognize the family as a definite conception, when, in his "Systema Naturae", he placed all those species known to him in his genus *Bombylius*, leaving the remaining species



in the great genus *Musca*. Scopoli shortly afterwards placed all the latter species in the genus *Anthrax*. These two huge groups, the Bombyliinae and Anthracinae, remained till 1808 when Schiner divided the family into four subfamilies, the Anthracinae, Bombyliinae, Lomatiinae, and Toxophorinae. Another subfamily, the Systropinae, was added by Weidemann a short time after. In 1913 Thomas Becker revised the genera of the world, and brought forward a classification in which the family had been divided into fifteen distinct groups. Becker's main character for these divisions was the positions of the veins  $R_{2+3}$ ,  $R_{4+5}$ , and r-m. Professor Bezzi, in his work "The Bombyliidae of the Ethiopian Region", reduced the number of subfamilies to thirteen. Bezzi, in this classification, places primary importance on the characters of the eyes. Those genera with simple eyes, i.e. eyes in which the hind border is entire and without an indentation, are placed in the Bombyliidae Homeophthalmae, and those in which the hind border of the eyes is indented in the Bombyliidae Tomophthalmae. The former group comprises what he considers the most ancient forms, mostly of Old World origin. These two groups are divided into thirteen subfamilies, viz., Exoprosopinae, Anthracinae, Bombyliinae, Lomatiinae, Toxophorinae, Cylleniinae, Usiinae, Phthiriinae, Cyrtosiinae, Mariobezziinae, Heterotropinae, Cytheriinae, and Systropinae. All these groups, except the Mariobezziinae, Heterotropinae, and Usiinae, are represented in the Australian region by various genera. This classification appears to be satisfactory in so far as the Australian genera of the subfamilies Exoprosopinae, Bombyliinae, Anthracinae, Lomatiinae, Systropinae, and Toxophorinae are concerned. The other three subfamilies, the Phthiriinae, Cylleniinae and Cyrtosiinae, are composed of a heterogeneous collection of genera allied in their respective groups by almost minor characters. For instance, in the Cyrtosiinae we have two genera, *Cyrtomorpha* and *Pachyneres*, which are of a totally dissimilar appearance, allied mainly by the absence of the vein  $R_4$ . *Cyrtomorpha* resembles the genus *Bombylius* in general appearance, and *Pachyneres* approaches the Empidae. I am not yet in a position to attempt a reclassification, but it seems to me that an examination of the genitalia, especially of the female, might lead to a more natural division of the family, and in this matter I am collaborating with Mr. G. H. Hardy, whose interests lie mostly in the phylogenetic conceptions to be gained therefrom.

*Key to the Subfamilies.*

1. Hind border of the eyes with a distinct indentation; eyes with a bisecting line .... 2  
Hind border of the eyes entire; eyes without a bisecting line ..... 4
2.  $R_{2+3}$  originates from  $R_{4+5}$  at right angles and close to the vein r-m ..... 3  
 $R_{2+3}$  originates from  $R_{4+5}$  at an acute angle and distant from the vein r-m .....  
..... Lomatiinae
3. Third segment of antennae with an apical pencil of hairs; pulvilli present .....  
..... Anthracinae  
Third segment of antennae with a minute spine or an elongate and distinct style; pulvilli absent ..... Exoprosopinae
4. Occiput raised, bilobate above and with a central cavity ..... Cylleniinae  
Occiput not raised, not bilobate above and devoid of a central cavity ..... 5
5.  $R_4$  missing ..... Cyrtosiinae  
 $R_4$  present ..... 6
6. Abdomen elongate and pedunculate; metasternum exceedingly developed; hind legs extremely long and strong; wings without an alula and with a diminished lobe ..... Systropinae  
Abdomen not especially elongate and never pedunculate; metasternum normal; hind legs sometimes long but never very strong; wings with alula present; lobe well developed ..... 7



7. Prothorax well developed and beset with strong curved spines; M with only two branches; body covered mainly with scales; legs very stout ..... *Toxophorinae*  
 Prothorax normal and never beset with strong curved spines; M with three branches (except in *Geron*); body covered with numerous hairs and scales; legs slender ..... 8
8. Tibiae armed with distinct rows of bristles; body bristly;  $R_4$  usually curved; palpi one-jointed; abdomen oval or rotund ..... *Bombyliinae*  
 Tibiae devoid of bristles arranged in rows; if bristles are sometimes present then the palpi are two jointed; body never bristly;  $R_4$  usually straight ..... *Phthiriinae*  
 This key is an abstract of that given by the late Professor Bezzi.  
*Note.*—Bezzi has placed the two genera, *Eclimius* and *Marmasoma* in the *Cylleniinae*. The occiput is certainly raised in both genera, and bilobate in *Eclimius*, but in *Marmasoma* no bilobation is visible and neither genus possesses a central cavity that can be seen.

#### Subfamily EXOPROSOPINAE.

The head is large and globular. The occiput is raised, bilobate above, and with a central cavity. The eyes are separated in both sexes, and have a long and distinct bisecting line. The frons at the vertex of the head is of varying widths in the males. The antennae are short, well apart at the base, with an elongate and somewhat conical third joint which may be furnished with an apical spine or a long and distinct bristle-like style. The abdomen is large and covered with long hairs and scales, generally in the form of bands. The genitalia of the female are armed with a circlet of bristly spines. The legs are slender, with the fore pair abbreviated and the hind pair rather long. There are no pulvilli in the Australian species. The wings are strong, with a well developed lobe and alula.  $R_{2+3}$  originates from  $R_{4+5}$  at right angles and close to r-m. Cells Cu and  $R_5$  are sometimes closed.

Five genera fall into this subfamily, *Hyperalonia*, *Exoprosopa*, *Villa*, *Lepidanthrax*, and *Pseudopenthes*. Those species previously recorded in the genus *Anthrax* are now placed in the genera *Villa* and *Pseudopenthes*. The genotype of Scopoli's genus, *Anthrax*, has been shown to possess a pencil of hairs at the apex of the third antennal joint. Scopoli even stated this in his description of the genus, but some confusion had arisen, so that those species possessing such a pencil of hairs at the apex of the third antennal joint had been placed in the genus *Argyramoeba*, while those species possessing at most a minute spine at the apex of the antennae had been erroneously recorded under the name *Anthrax*.

In the genus *Lepidanthrax* I have placed those species catalogued by Hardy as belonging to the genus *Cytherea*, a genus which is more closely related to *Bombylius* than to *Villa*. It differs from *Bombylius* in having a vestiture consisting mainly of scales, and antennae which are widely separated at their base.

#### Key to the Genera of the Exoprosopinae.

1. Third antennal joint with a long and distinct style ..... 2  
 Third antennal joint at most with a minute spine ..... 3
2. The cell  $R_3$  only, divided by a crossvein ..... *Exoprosopa* Macquart  
 The cells  $R_3$  and  $R_4$  each divided by a crossvein ..... *Hyperalonia* Rondani
3. Proboscis well exceeding in length the oral aperture .... *Lepidanthrax* Osten-Sacken  
 Proboscis at most slightly exceeding in length the oral aperture ..... 4
4. Ocelli placed somewhat below the vertex of the head; claws of posterior tarsi with a long and acute basal tooth; cell 2nd  $M_2$  long and narrow .. *Pseudopenthes*, n. gen.  
 Ocelli placed at the vertex of the head; claws of posterior tarsi devoid of a basal tooth; cell 2nd  $M_2$  not long and narrow ..... *Villa* Lioy.

#### Genus HYPERALONIA Rondani.

*Hyperalonia*, Rondani, Archiv. per la Zool., iii, p. 58, 1863; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 44; 1923, 73.

Genotype, *Anthrax erythrocephala*, by original designation.

The head is globular and as broad as the thorax; the frons is very broad at the vertex in the male and not very noticeably broader in the female; the ocellar tubercle is rounded, prominent, and placed somewhat below the vertex of the head; the face is sharply prominent and is covered with hairs and scales; the antennae are rather strong, with a cylindrical first joint, a globular second, about half the length of the first, and an elongate, conical, third joint which bears a long and distinct bristle-like style at the apex; the proboscis is stout, generally slightly longer than the oral opening; the palpi are slender and one-jointed.

The thorax is quadrate, rather flattened, with rounded corners and is furnished with well developed pre- and post-alar bristles, situated on the humeral and post-alar calli, the bristles on the latter being generally 5-8 in number, long, and directed backwards; the scutellum is broad and semicircular and bears long, convergent bristles on its margin; the squamae are large with a fringe of long coloured scales; the halteres are slender.

The abdomen consists of seven segments, is rather broad, flattened below and convex above, generally curved and covered with scales and long hairs, the latter being particularly dense along the lateral margins; the male genitalia are not conspicuous and are set on one side; the genitalia of the female are armed with a circlet of short, blunt spines. The legs are slender, with the fore tibiae devoid of spines, and the tarsal claw usually provided with a short and obtuse basal tooth. The wings are strong with the typical venation of the Exoprosopinae; cells  $R_3$  and  $R_4$  are each divided by a crossvein; the cells  $R_5$  and Cu may be open or closed at the wing border.

*Range*.—South Europe, Asia, North and South America, North and South Africa, and Australia.

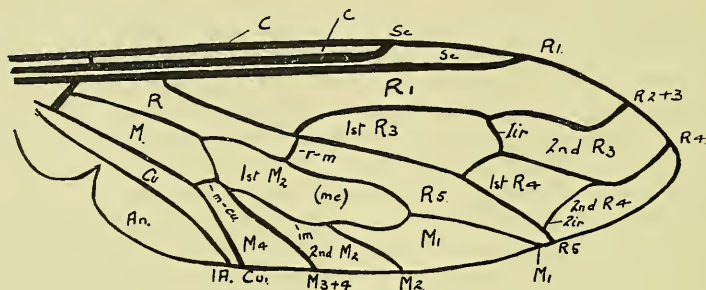
The character of the short and obtuse basal tooth on the tarsal claw is cited by Bezzi as a definite generic character. All the species examined have the basal tooth short and obtuse except a new species, *H. dentata*. This species possesses a basal tooth which is long and acute, like that found in *Exoprosopa*. Brunetti also noticed that this character was not constant for the genus among the Indian species. It appears, therefore, that the separation of *Hyperalonia* and *Exoprosopa* relies on the number of interradians in the cells  $R_3$  and  $R_4$ . This character I have found to be very reliable, which appears inconsistent with the amount of variation usual in the venation in the subfamily.

Australia is not very rich in species of *Hyperalonia*, only eleven species being so far known, of which nine are recorded, four being new. The other two species are represented by specimens in too bad condition for description. One is in the collection of the Macleay Museum, and the other is represented by two specimens in the South Australian Museum.

They are all large, thickset flies of similar appearance, frequenting sandy country, and are usually seen flying very low and close to the ground. *H. satyrus* Fabr. has been recorded as a hyperparasite of the scolid wasp, *Campsomeris radula*, and is also parasitic on the larva of an Asilid. Both the hosts feed on the grubs of Scarabaeidae attacking sugar cane. As the genitalia of the female in this genus are provided with a circlet of blunt spines, the species are probably all parasitic on other insects which pass some stage of their life histories below the surface of the ground.

*Distribution*.—The genus is widespread over the whole of the continent but is unknown from Tasmania. Two extralimital species occur, *satyrus* and *doryca*,

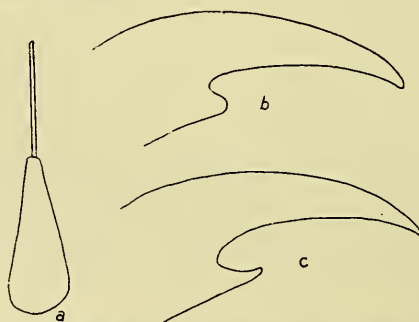
the former extending from New Guinea along the eastern coast, and the latter from the Solomon Islands to Piper's Flats in New South Wales; *septentrionis* and *hemifusca* are only known from the extreme north, and will probably be found to occur outside Australia at some future date. Both *bombylifformis* and *sinuatifascia* are widely distributed, though the latter has not been recorded further north than Cairns; *cingulata* is known from the Swan River (W.A.) to Biniguy, north-west N. S. Wales; *inquinata* and *dentata* are from Queensland and Victoria respectively.



Text-fig. 1. Wing of *Hyperalonia*.

Key to the Species of *Hyperalonia*.

1. Wings spotted ..... *bombylifformis* Macleay  
Wings not spotted ..... 2
2. Species covered almost entirely with yellow tomentum ..... *dentata*, n. sp.  
Species not covered entirely with yellow tomentum ..... 3
3. Sixth and apical segments of abdomen with white scales ..... 4  
Sixth and apical segments of abdomen with brown scales ..... *hemifusca*, n. sp.
4. Apical segments of abdomen with isolated spots of white scales ..... 5  
Apical segments of abdomen covered entirely with white scales ..... 7
5. Abdomen with yellowish hairs on each side of the basal segment; three pairs of white spots on the apical segments ..... *satyrus* Fabricius  
Abdomen with reddish hairs on each side of the basal segments; apical segments with two pairs of white spots ..... 6
6. Third segment of abdomen with a band of white scales ..... *doryca* Boisduval  
Third segment of abdomen with a pair of white spots on the sides .. *inquinata*, n. sp.
7. Cell  $R_5$  closed; mc entirely hyaline or almost so ..... *septentrionis*, n. sp.  
Cell  $R_5$  open; apex of mc broadly fuscous ..... *sinuatifascia* Macquart  
Cell  $R_5$  open; apex of mc hyaline ..... *cingulata* v.d. Wulp



Text-fig. 2. (a) Third antennal segment of *Hyperalonia* and *Exoprosopa*; (b) claw with a short basal tooth; (c) claw with a long and acute basal tooth.



## HYPERALONIA DORYCA Boisduval.

*Anthrax dorycus* Boisduval, Voyage de l'Astrolabe, Entom., ii, 1835, 665, tab. xii, fig. 12; Osten-Sacken, *Annals Mus. Civ. Genova*, xvi, 1882, 443; *Berlin. Entom. Zeitschr.*, xxvi, 1882, 112.—*Exoprosopa doryca*, v. d. Wulp, *Notes Leyden Mus.*, vii, 1886, 36; *Catal. Dipt. Sth. Asia*, 1896, p. 70; Meijere, *Nova Guinea*, v, Zool., 1906, 76.

♂. The head is mainly black; the occiput is black and is covered with short, depressed, black hairs and yellowish or reddish scales; the ocellar tubercle is prominent and is crowned with some erect black hairs; the frons is blackish but runs to brown towards the antennae; the face is brownish, both face and frons being clothed with dense black hairs; the eyes have a long and distinct bisecting line, and the indentation of their hind border is well developed; the first segment of the antennae is brown, the second and third are black, the latter with a bristle-like style of almost its own length, and the two former with stiff black hairs; the proboscis is stout and black.

The thorax is mainly black, bearing stiff, dense, reddish hairs in front and on the sides, and thin, depressed golden, and numerous erect black hairs on the dorsum; the bristles are well developed and black; the scutellum is brownish, covered with yellowish or golden, and black hairs and furnished with long, strong, black, marginal bristles; the pleurae have tufts of reddish hairs, with a few black hairs below the wing insertions; the squamae are brownish with a fringe of yellow scales; the halteres are black.

On the abdomen there is a very narrow band of yellow scales on the anterior border of the second segment and a broad band of white scales on the third, the latter being somewhat dilated on each side; the sixth and apical segments each have two admedian spots or areas of white scales; the rest of the dorsum is covered with black scales and scattered, erect, black hairs; there is a dense reddish tuft of hairs on each side of the basal segment and some long white hairs on each side of the third; the other segments are clothed laterally with long black hairs; the venter is black with numerous black hairs and with a broad, white, median stripe extending from the base for two-thirds of its length.

The legs are black covered with black scales and hairs; the basal tooth on the tarsal claw is short and obtuse.

The wings are subhyaline but glistening, and are dark fuscous along the fore margin, the colour descending to tinge the origin of the vein  $R_{2+3}$  and also the vein r-m; cells Cu,  $R_1$ ,  $M_1$ , 2nd  $M_2$  and  $M_4$  are all open.

Length of body, 13-16 mm.; of wing, 13.5-17 mm.

The female differs from the male only in the slightly broader frons at the head vertex. The isolation of sexes in this genus has been rather difficult. The frons at the vertex in the female is so little broader than that of the male as to be almost imperceptible to those who have not studied the genus. I find the only certain method for their separation lies in the position and appearance of the unexserted genitalia. In the male the genitals lie somewhat to one side, while in the female they are centrally placed.

*Hab.*—Queensland: Kuranda and Rockhampton; N. S. Wales: Piper's Flats. This species is also recorded from the Solomon Islands and New Guinea.

## HYPERALONIA HEMIFUSCA, n. sp.

♂. The head is mainly blackish; the occiput is blackish above, red below, and is clothed with numerous black depressed hairs and brown scales, which

become somewhat whitish on each side of the hind indentations of the eyes; the ocellar tubercle is black and is crowned with some erect black hairs; the frons is brownish-black at the vertex and is clothed with erect black hairs and some light brown, almost golden scales; the face is brownish and is covered with similar scales and hairs though the latter are not as numerous as on the frons; the antennae have the first two segments brown, covered with long and short black hairs respectively, and the third black; the style is black and is about one-third the length of the third segment; the eyes possess a well marked indentation of the hind border and a long and fairly distinct bisecting line; the proboscis is black and short, being no longer than the oral aperture.

The thorax is black-brown, with thick, brown hairs in front and on the sides and black hairs and light brown scales on the dorsum; there is a patch or stripe of whitish hairs above the wing insertions; the bristles are well developed and black; the scutellum is brown with brown scales and long black marginal bristles; the pleurae are dusted with grey and have the tufts of hairs somewhat brownish; the squamae are large, flesh-coloured, with a short fringe of light brown scales; the halteres are yellowish with lighter knobs.

The abdomen is as long as the thorax, and has the first segment blackish, the others brown with decreasing black median areas; the whole of the dorsum is covered with light brown scales and erect, sparse, brown and black hairs, though the scales on the second segment appear somewhat lighter in colour; on each side of the basal segment there is a brownish or dirty white tuft of hairs; the venter is brown with brown scales and hairs.

The legs are mainly dark brown, the tibiae towards the apex, and the tarsi, being much darker, almost blackish; they are clothed with brown scales and black hairs; the basal tooth on the tarsal claw is short and obtuse.

The wings are hyaline with the base and foremargin for two-thirds the length fuscous, the colour descending to the crossvein between the cells M and M<sub>1</sub>; cells R<sub>5</sub>, M<sub>1</sub>, M<sub>2</sub> and M<sub>4</sub> are all open; cell Cu is narrowly open; there is a greyish spot at the apex of cell M.

Holotype ♂, Somerset, North Queensland (no date); allotype ♀, Somerset, North Queensland (no date). Length of body, ♂, ♀ 12 mm.; of wing, ♂ 10 mm., ♀ 10.5 mm.

The female is similar to the male, although in the allotype the scutellum is rather reddish, and the median row of spots on the abdomen is more conspicuously marked.

Holotype and allotype are in the South Australian Museum. There are three paratype males in this collection all from Somerset.

#### HYPERALONIA CINGULATA v. d. Wulp.

*Exoprosopa cingulata* v. d. Wulp, *Notes Leyden Mus.*, vii, 1885, 62.—*Hyperalonia cingulata*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 47; 1923, 73.

♂. The head is brown; the occiput is mainly black, and is covered with black hairs and light brown scales which are somewhat lighter in colour near the hind indentations of the eye borders; the ocellar tubercle is black and is crowned with a few erect black hairs; the face and frons are brown, clothed with light brown tomentum and numerous black hairs; the first two segments of the antennae are brown, the third black, longer than the first and second together, and with a style about half its length; the eyes have a well marked indentation at the hind

borders and the bisecting line is well developed; the proboscis is black, slightly longer than the oral opening.

The thorax is blackish, and bears stiff, dense, yellowish or brown hairs in front and on the sides, and some brown scales and hairs dorsally; the bristles are well developed, black; the scutellum is brownish with brown tomentum and long black marginal bristles; the squamae are brownish with a long fringe of yellowish scales; the halteres are brown.

The abdomen is blackish, with segments two and three largely brown laterally and each segment with a narrow brown posterior border; there is a band of white scales on the second segment, and the fifth, sixth, and apical segments are covered with similar scales; segments three and four are clothed with brown scales with a narrow posterior border of black scales; the tuft of hairs on each side of the first segment is dirty white or brownish; the venter is clothed with thin white pile.

The legs are brownish, with somewhat darker tibiae and tarsi, and are covered with brown and black scales and black hairs; the basal tooth on the tarsal claw is short and obtuse.

The wings are hyaline, with the base and the costal margin for two-thirds the length and one-half the breadth, light fuscous; the colour descends as a half-band to cover the basal third of the median cell, and the crossvein between the cells M and M<sub>1</sub> leaving a large clear area in cell M.

Length of body, 13-17 mm.; of wing, 15-18 mm.

The female is similar to the male, with the frons slightly broader at the vertex of the head.

*Hab.*—N. S. Wales: Darling River, Biniguy; Central Australia: Alice Springs; W. Australia: Swan River.

This species appears to be comparatively rare. In the material examined there were nine specimens, three of which were taken at Biniguy, near Moree, N. S. Wales. At first sight it is very similar to *H. sinuatifascia* but may be distinguished by the lighter brown colour of the wings, and the almost hyaline apex of the median cell.

#### HYPERALONIA SATYRUS Fabricius.

*Bibio satyrus*, Fabricius, *Syst. Ent.*, 1775, 758; *Sp. Ins.*, ii, 1781, 415; *Mans. Ins.*, ii, 1787, 329.—*Musca satyrus*, Gmel., *Syst. Nat.*, v, 1792, 2831.—*Anthrax satyrus*, Fabricius, *Ent. Syst.*, iv, 1794, 259; *Syst. Ent.*, 1805, 123; Weidemann, *Dipt. Exot.*, 1821, 151; *Auss. zweifl. Ins.*, i, 1828, 322; Walker, *List Dipt. Brit. Mus.*, ii, 1849, 243; *Ins. Saund. Dipt.*, 1852, 166.—*Exoprosopa satyrus*, v. d. Wulp, *Tijd. v. Ent.* (2), iii (xi), 1868, 106; Osten-Sacken, *Cat. Dipt. Nth. America*, ed. 2, p. 87, note; v. d. Wulp, *Cat. Dipt. Sth. Asia*, 1896, 69.—*Exoprosopa funesta*, Walker, *List Dipt. Brit. Mus.*, ii, 1849, 242.—*Exoprosopa insignis*, Macquart, *Dipt. Exot.*, suppl. 5, 1855, 73; Bergroth, *Stett. Ent. Zeit.*, lv, 1894, 72.—*Hyperalonia satyrus*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 44 and 1923, 73.

♂. The head is brownish-black; the occiput is black covered with tawny scales, which appear whitish at the hind eye borders; the ocellar tubercle is black, prominent, and is crowned with some erect black hairs; the frons is blackish, brown medianly, and is covered with numerous black hairs and some yellowish scales; the face is brownish, with brown scales and black hairs; the first two segments of the antennae are mainly brownish, and are covered with long, and short, stiff black hairs respectively; the third segment is black, with a style of almost its own length; the eyes are distinctly indented at the hind borders and



the bisecting line is long and well marked; the proboscis is black and slightly longer than the oral aperture.

The thorax is black with brownish post-alar calli; anteriorly and laterally there are dense, yellowish or yellow-brown hairs, and dorsally some tawny scales and short, erect, black hairs; the hairs above the wing insertions are much lighter in colour than those on the sides and in front; the bristles are well developed and black; the scutellum is brownish with tawny scales and long black marginal bristles; the squamae are yellowish and bear a long fringe of whitish scales; the halteres are brown with lighter knobs.

The abdomen is black with brownish areas on each side of the basal segments; there is a band of yellowish white tomentum on the second segment and three pairs of white spots on the fifth, sixth, and apical segments; the remainder of the dorsum is clothed with black scales and sparse black hairs; on each side of the basal segment the hairs are yellowish, becoming white on the second; the other segments have black hairs on the sides; the venter is black and covered mainly with black scales; there is a broad basal and a narrow subapical band of white scales.

The legs are black, covered with black scales and hairs; the basal tooth on the claw is short and obtuse.

The wings are fuscous at the base and along the foremargin for two-thirds the length; the remainder of the wing is smoky, clearing to the inner border and apex; cells Cu, R<sub>1</sub>, M<sub>1</sub>, M<sub>2</sub> and M<sub>3</sub> all open. Female similar.

Length of body, 13-26 mm.; of wing, 15-23 mm.

*Hab.*—Queensland: Cape York, Lizard Is., Cairns, Meringa, Endeavour Rv., Pt. Denison, Rockhampton, Eidsvold, Brisbane, Chinchilla; N. S. Wales: Newcastle, Piper's Flats, Glenreagh; Northern Territory: Katherine, Malaranka, Port Darwin. There are some specimens in the Macleay Museum labelled South Australia. This species is also recorded from Port Moresby, New Guinea, and Moa and Badu Is., Torres Straits.

#### HYPERALONIA BOMBYLIFORMIS Macleay.

*Anthrax bombyliformis* Macleay, in King's Narr. Surv. of South Austr., ii, 1830, 468; Weidemann, *Auss. zweift. Ins.*, ii, 1830, 648; Walker, *List Dipt. Brit. Mus.*, 1849, 241; Kirby, *Ann. Mag. Nat. Hist.* (5), xiii, 1884, 458.—*Ligyra bombyliformis*, Newman, *Entom.*, 1, 1841, 220; Walker, *Ins. Saun. Dipt.*, 1852, 166.—*Exoprosopa punctipennis* Macquart, *Dipt. Exot.*, Suppl. 4, 1849, 106.—*Exoprosopa albiventris*, Thomson, *Eugenies Resa Dipt.*, 1869, 480.—*Hyperalonia bombyliformis*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 46; 1923, 73.

♂. The head is blackish; the occiput is blackish, covered with numerous depressed black hairs and with light brown scales close to the indentation of the hind eye margins; the eyes have a well marked indentation of the hind borders and a long and distinct bisecting line; the ocellar tubercle is black or brownish-black, prominent, and crowned with a few long black hairs; the frons is blackish above, brownish below, covered with brown scales and erect black hairs; the face is sharply conical, brownish, covered with brown scales and some black hairs, the latter being abundant at the mouth borders; the first two segments of the antennae are brownish, the third is black with a style of its own length; the proboscis is black, slightly longer than the oral opening.

The thorax is blackish-brown, with dorsal dark brown scales and some light brown and black hairs, the light brown hairs being conspicuous above the wing

insertions; the anterior and lateral hairs are dense, stiff, and brownish and there are stiff black hairs below; the bristles are well developed and brown; the scutellum is brownish-red, with dark brown scales and bearing long black marginal bristles; the squamae are dark with a long fringe of yellowish scales; the halteres are brown.

The abdomen is brownish-red, with median black areas enlarging towards the apex; the second segment is covered with a band of dense yellowish-white tomentum, and the fifth, sixth, and apical segments are clothed with white scales; the basal lateral tuft is yellowish and extends to the posterior border of the second segment; the venter is clothed with white pile, black at the sides and on the apex.

The legs are dark brown, covered with black scales and hairs; the basal tooth on the claw is short and obtuse.

The wings may be smoky with the base and costal margin fuscous, or hyaline with the same fuscous area, or entirely hyaline; there are always about eight fuscous spots on the disc of the wing, though they may be sometimes very light in colour; cells Cu and R<sub>5</sub> may be sometimes closed, and there may be an extra crossvein present in cell R<sub>3</sub>.

The female is similar.

Length of the body, 14-22 mm.; of the wing, 13.5-20 mm.

*Hab.*—Queensland: Cape York, Somerset, Kuranda, Palm Is., Rockhampton, Westwood, Eidsvold, Brisbane, Peel and Stradbroke Islands, Chinchilla, Inglewood; N. S. Wales: Sydney, Port Hacking, Piper's Flats, Biniguy; Western Australia: King's Sound, Ulan, Beverly; Northern Territory: Katherine, Malaranka, Darwin, Groote Eylandt.

This species varies somewhat in the coloration of the wing, and I have seen one specimen in which the wing is quite hyaline without any traces of brown colour upon it. The spots are always present, however, and constitute a safe character for identification.

There yet remains some doubt as to whether this species should be called *bombylifformis* or *sylvanus*, the latter name being at present applied to a species of *Comptosia*. Banks collected his material along the Queensland coast about May and June. G. H. Hardy recently spent some time at the Palm Islands during June, and he informs me that the only species with spotted wings taken at that time was *bombylifformis*. It is therefore possible that the name *sylvanus* has been misapplied and should be attached to this species.

#### HYPERALONIA SINUATIFASCIA Macquart.

*Exoprosopa sinuatifascia*, Macquart, *Dipt. Exot.*, Suppl. 5, 1855, 72.—*Exoprosopa macraspis*, Thomson, *Eugenes Resa Dipt.*, 1868, 479.—*Hyperaltonia argenticincta*, Bigot, *Ann. Soc. Ent. France* (7), xli, 1892, 343.—*Hyperaltonia sinuatifascia*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 45; 1923, 73.

♂. The head is black; the occiput is brownish, with white or yellowish-white scales at the hind borders of the eyes; the eyes have a well marked indentation of the hind borders and a long bisecting line; the ocellar tubercle is black, crowned with a few erect black hairs; the frons and face are brownish, covered with brown scales and black hairs; the first two segments of the antennae are brownish, bearing long and short stiff black hairs respectively; the third is black with a style almost its own length; the proboscis is black, and slightly protrudes beyond the epistoma.

The thorax is blackish, covered dorsally with dark brown scales and black hairs and bearing long, dense, lighter brown hairs in front and on the sides; there is a stripe or patch of light brown or whitish hairs above the wing insertions; the bristles are well developed and black; the scutellum is brownish-red and bears long black marginal bristles; the squamae are dark with a long fringe of pale scales; the halteres are brown.

The abdomen is brownish-red, with a median dorsal row of black spots, the spots increasing in size apically; there is a band of white scales on the second segment, and the fifth, sixth and apical segments are also covered with white scales; the other segments are clothed with black scales, and towards the apex there are numerous erect black hairs; the tuft of hairs on each side of the base is yellowish-white; the venter is brown and is clothed with thin white pile.

The legs are mostly brown with darker tarsi and are covered with black hairs and scales; the basal tooth is short and obtuse.

The wings are hyaline with the base, the costal margin to the apex of the subcostal cell, two-thirds of cell  $R_1$ , half of  $R_3$ , one-third of  $R_5$ , apical portion of the median cell, almost all cell M, and one-third of the cubital cell, fuscous; there is a greyish spot at the apex of cell M.

The female is similar.

Length of body, 11-20 mm.; of wing, 12-19 mm.

*Hab.*—Queensland: Meringa, Westwood, Brisbane, Chinchilla; N. S. Wales: Biniguy, Barrington Tops, Toronto, Blackheath, Como; W. Australia: Ulan; N. Territory: Katherine. There are also some specimens in the Macleay Museum labelled South Australia.

#### HYPERALONIA DENTATA, n. sp.

♀. The head is black; the occiput is black, clothed with yellow scales and short depressed black hairs; at the hind indentations of the eyes the scales appear whitish; the ocellar tubercle is prominent and black; the face and frons are black, clothed with dense yellow tomentum, which extends half way up the frons; the frons also has numerous erect black hairs; the antennae are black, the first and second segments being furnished with stiff yellow hairs; the proboscis is black.

The thorax is black with dense yellow hairs in front and on the sides and with shorter depressed tomentum of a similar colour on the dorsum; the bristles are well developed and black; the scutellum is brownish with yellow tomentum and long black marginal bristles; the pleurae also bear yellow hairs.

The abdomen is brownish, but black on the sides, about as long as the thorax, and with a somewhat rounded apex; it is uniformly clothed on the sides and on the dorsum with dense yellow scales and hairs, with which a few black hairs are mingled; the venter is black, also with yellow hairs, which become rather whitish towards the apex.

The legs are black, dusted with yellow scales; the basal tooth on the posterior tarsus is long and acute.

The wings are well developed and strong, brown at the base and the costal border for two-thirds its length; the veins are also surrounded with brown; the rest of the wing is smoky, clearing a little towards the inner margin; cells Cu,  $R_5$ ,  $M_1$ ,  $M_2$  and M, all open.

Holotype female, labelled Victoria only. Length of body, 18 mm.; of wing, 19 mm. There is a single paratype in Mr. J. Mann's collection, also labelled Victoria. The male is unknown. The holotype is in the Queensland Museum.



## HYPERALONIA INQUINITA, n. sp.

♀. The head is brownish-black; the occiput is brownish-black and bears numerous short depressed black hairs and some yellowish white scales, which are thickest near the hind indentations of the eyes; the frons is brownish-black and is covered with erect black hairs and yellowish-white scales; the face is brownish-black, becoming somewhat lighter in colour towards the inner eye margins and close to the antennae, and is clothed with similar tomentum; the first two segments of the antennae are brown, the second being about one-half as long as the first, bearing long and short black hairs respectively; the third is black, with greyish reflections, longer than the first and second together, and with a style about half its length; the ocellar tubercle is prominent, brownish, and crowned with some erect black hairs; the eyes possess a distinct indentation at the hind borders and a long and distinct bisecting line; the proboscis is black and does not project beyond the epistoma.

The thorax is black and bears stiff, dense, reddish hairs in front and on the sides, the hairs clothing the dorsum being thinner, and are almost golden in colour; there is a patch of hairs above the wing insertion which are much lighter in colour than those on the rest of the dorsum; the bristles are black; the scutellum is dark brown, but blackish at the base, with reddish-yellow tomentum and long, black, marginal bristles; the pleurae bear stiff black hairs, which become somewhat reddish above; the squamae are black with a long fringe of yellow scales; the halteres are blackish.

The abdomen is of the usual shape and curvature, as long as the thorax and mainly black; the second segment is clothed with yellowish-white tomentum, the band being somewhat dilated laterally; there is a small spot or area of white scales on each side of the third segment and two pairs of similar, though somewhat larger areas, on the sixth and apical segments; the rest of the dorsal tomentum consists mainly of black scales and a few black hairs; laterally the basal segment is clothed with long reddish hairs, which become yellowish on the sides of the second; there are a few white hairs mixed with the dense black hairs on the sides of the third; the remaining segments are clothed laterally with black hairs; the venter is black and black-pollinose.

The legs are black, and are covered with black scales and hairs; the basal tooth on the tarsal claw is short and obtuse.

The wings are divided into an upper brown half and a lower hyaline half, the outline of the brown reaching the base of the axillary lobe from whence it extends in an almost straight line to the apex of the subcostal cell, the lowest part of the inner border being the crossvein between cells M and M<sub>1</sub>; there is a greyish spot at the apex of cell M; cells Cu, R<sub>5</sub>, M<sub>1</sub>, M<sub>2</sub> and M<sub>4</sub> are all open.

Holotype female, Bunya Mts., Q'land, 9th January, 1925. Length of body, 17 mm.; of wing, 17.5.

There is a single paratype female in the collection of the Macleay Museum, labelled Rockhampton.

The holotype is in the Macleay Museum.

## HYPERALONIA SEPTENTRIONIS, n. sp.

♂. The head is brownish; the occiput is reddish, but black laterally, and covered with short depressed black hairs and white scales, which are most abundant near the posterior eye margins; the ocellar tubercle is prominent, rounded and black; the frons is blackish-brown and is clothed with dense, light

brown or dirty white scales, and numerous erect black hairs; the face is somewhat more brown and bears similar scales and some shorter black hairs; the cheeks are black; the first two segments of the antennae are brown, with stiff black hairs, the third is black, rather short, not much longer than the first; the style is black and equal in length to the third segment; the proboscis is black with brownish labella; the palpi are slender and black.

The thorax is black and has dense stiff brown hairs in front, and dark brown scales and some black hairs on the dorsum; on each side there is a definite stripe of white hairs; the bristles are black; the scutellum is brown with brown scales and black marginal bristles; the pleurae are dusted with grey and have brown hairs, which become somewhat reddish below the wing insertions; the squamae are flesh-coloured with a fringe of whitish scales; the halteres are brownish with reddish-yellow knobs.

The abdomen is brown with black median areas on segments two, three and four, the area decreasing in size in that order; there is a band of white scales on segment two, which is dilated on the sides, and the fifth, sixth and apical segments are also clothed with white scales; the remaining segments are clothed with brown and black scales and sparse black hairs, though there are traces of white scales on the sides of segments 3 and 4. The tuft on each side of the basal segments is whitish; the venter is brownish and white-pollinose.

The legs are dark brown with darker tarsi, and are covered with black and brown scales and black hairs.

The wings are hyaline with the base and fore margin brown, the costal cell being rather greyish at the base; the colour is dilated from the base to reach the median crossvein; cell  $R_5$  is closed at the wing margin; cells  $Cu$ ,  $M_1$ ,  $M_2$  and  $M_3$  are all open.

Holotype male, Somerset, Nth. Q'land, McNamara. Allotype female, Somerset, Nth. Q'land, McNamara. Length of body, ♂ 13 mm., ♀ 15 mm.; of wing, ♂ 11 mm., ♀ 14.5 mm.

The female allotype differs slightly from the male in the colour of the scales, those on the female being somewhat golden. This is possibly due to the condition of the specimen. The wings are more broadly brown, the colour being deeper at the base and extending well past the vein r-m.

There are three paratypes all from the same locality, which, with the allotype and holotype, are in the collection of the South Australian Museum.

#### Genus *Exoprosopa* Macquart.

*Exoprosopa*, Macquart, *Dipt. Exot.* (1), 1840, 35; White, *Proc. Roy. Soc. Tasm.*, 1916, 205; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 47; 1923, 74.

Genotype, *Bibio capucina* F. by Rondani's designation.

The head is globular, and as broad as the thorax; the ocellar tubercle is prominent, rounded, and placed somewhat below the vertex of the head; the frons is raised and the face is sharply prominent, both face and frons being covered with hairs and sometimes scales; the antennae are widely separated at the base; the first segment is cylindrical, about twice as long as the globular second segment; the third is conical, generally as long as, if not longer than, the first and second together; the style is long, bristle-like and distinct; the eyes in both sexes are widely separated at the vertex; the bisecting line is usually long and distinct; the proboscis is short, with just the tip sometimes showing beyond the epistoma; the palpi are small and slender.

The thorax is quadrate, and is furnished with well developed bristles on the humeral and post-alar calluses, those on the post-alar callus being especially strong and directed backwards; the scutellum is broad and semicircular and bears long bristles on its margin; the squamae are large, with a fringe of scales, and the halteres are slender.

The abdomen is generally broad, somewhat flattened, as long as, or longer than the thorax, and covered with depressed scales and erect hairs; the male genitalia are not conspicuous, and the genitalia of the female are armed with a circlet of blunt spines.

The legs are slender; the fore tibiae are devoid of spines; the basal tooth on the claw is always long and acute; pulvilli are absent.

The wings are strong with a well developed axillary lobe and a distinct alula; cell  $R_1$  possesses an interrarial crossvein; the cubital cell is sometimes closed; cells  $R_5$ ,  $M_1$ ,  $M_2$  and  $M_3$  are all open; the venation is typical of that found in the Exoprosopinae. The range is world wide.

As far as is known, there are five species of this genus in Australia, all of which are described below, one being new. In appearance and habits they are similar to the species of *Hyperalonia*. Nothing is known of their life histories, but as the genitalia of the female bear a circlet of short, blunt, spines, they probably have the same host relationships as the species of *Hyperalonia*.

*Distribution*.—The most widely distributed species is *adelaidica*, which is recorded from the whole of the continent, excepting the extreme north; *stellifer* is confined to Western Australia and *marginicollis* to Queensland; *obliquebifasciata* and *dimidiata* are from Western Australia and Groote Eylandt, respectively. Groote Eylandt is in the Gulf of Carpentaria, so it is probable that *dimidiata* is an extralimital species. The genus is unknown from Tasmania, although Tasmania was recorded as the type locality of *obliquebifasciata*.

*Key to the Species of Exoprosopa.*

1. Abdomen blue or green ..... *marginicollis* Gray  
Abdomen black or brown ..... 2
2. Wings brown with the apex only, broadly hyaline ..... *stellifer* Walker  
Wings brown with the hind margin, or part of it, and the apex also, hyaline .... 3
3. Wings cut sharply into a brown basal half and an apical hyaline half .....  
..... *dimidiata*, n. sp.  
Wings not cut sharply into a basal brown and an apical hyaline half ..... 4
4. Face covered with white scales; the brown of the wings not reaching the hind margin ..... *obliquebifasciata* Macquart  
Face covered with brownish scales; the brown of the wings reaches the hind margin where it may contain a large indented triangular hyaline area, or the area may be much reduced to form two somewhat circular areas .... *adelaidica* Macquart

*EXOPROSOPA MARGINICOLLIS* Gray.

*Anthrax marginicollis* Gray, in Griffith's *Animal Kingdom*, xv, Ins. ii, 1883, 780, Pl. cxxv, fig. 6.—*Exoprosopa marginicollis*, Hardy, *Proc. Roy. Soc. Tasm.*, 1923, p. 74.

A bright metallic species, readily recognized by the metallic green or blue thorax, bearing anterior and lateral white hairs, those on the sides appearing as two white stripes, and a metallic blue or green abdomen. The wings are deep brown, almost black, with the apex and a large triangular area on the inner border hyaline. Length of body, 15-17 mm.; of wing, 14.5-16 mm.

*Hab.*—Queensland: Port Denison, Westwood.

The blue and green colouring of the thorax and abdomen appear to be interchangeable. I have seen some specimens in the Macleay Museum that are almost



entirely blue, and there are other specimens in which the abdomen is green or blue, and thorax, blue or green.

EXOPROSOPA OBLIQUEBIFASCIATA Macquart.

*Exoprosopa obliquebifasciata*, Macquart, *Dipt. Exot.*, suppl. 4, 1850, 107, Pl. x, fig. 5; *E. obliquefasciata*, White, *Proc. Roy. Soc. Tasm.*, 1916, 205; *E. obliquifasciata*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 48, and 1923, 74.

♀. The head is black; the occiput is black, and is clothed with white scales which become silvery near the indentations of the posterior eye borders; the frons is blackish above and brown below; the face is brown, both frons and face with silvery-white scales and some black hairs, the latter particularly numerous on the frons; the first two segments of the antennae are brown, covered with black hairs, the third is somewhat darker, rather stout, about as long as the first segment; the style is black, and is slightly longer than the third segment; the ocellar tubercle is brownish; the hind borders of the eyes have a distinct indentation, but the bisecting line is rather faint; the proboscis is black and slender.

The thorax is black with dorsal brown and white scales and black hairs; the white scales occupy the anterior part and extend along each side, above the wing insertions, as a distinct stripe; the collar consists of stiff, dense, brown hairs; the bristles are black; the scutellum is brownish-red, but somewhat blackish at the base; the marginal bristles are long and black; the pleurae are clothed with reddish-brown hairs; the squamae are large, light brown, and are fringed with white scales; the halteres are brownish with yellowish knobs.

The abdomen is elongate, longer than the thorax, brownish, with a dorsal row of black spots, decreasing in size apically; the second segment is clothed with a band of white scales, which are also present on the apical segments; the tuft of hairs on each side of the base is white; the venter is brownish with white scales; the genital spines are long and reddish.

The legs are slender, brown, with the tarsi somewhat darker.

The wings are rather long and slender, hyaline, but brown at the base and along the fore margin for two-thirds the length and half the breadth, the colour descending at its apex to the middle of the vein  $M_1$ , where it is dilated to cover the basal two-thirds of cell  $M_1$ , and the apex of the median cell; there is a small greyish spot at the apex of the second basal; the median cell is very long and narrow as is also the cubital.

Length of body, 11 mm.; of wing, 12 mm.

*Hab.*—Beverly, Western Australia.

I have only seen a single specimen of this species, and it is in the South Australian Museum. Although this species was described from Tasmania, I feel sure it is a case of misnamed locality, as no species of the genus is known from there and this specimen agrees remarkably well with Macquart's description.

EXOPROSOPA ADELAIDICA Macquart.

*Exoprosopa adalaidica*, Macquart, *Dipt. Exot.*, suppl. 5, 1855, 70, Pl. iii, fig. 4; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 48.—*Exoprosopa laterimbata*, Bigot, *Ann. Soc. ent. France* (7), lxi, 1892, 346; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 47.

♂. The head is black; the occiput is black, covered with depressed black hairs and with numerous yellow-white scales at the inner borders of the eyes, near the indentations; the frons is brown and is covered with erect black hairs and some brown scales, the latter being particularly dense on the basal half; the face

is sharply prominent, brown, and covered with dense brown scales and black hairs; the first segment of the antennae is brown and bears long black hairs, the second may be brown or blackish, and is furnished with short black hairs, the third is black with a style about two-thirds its length; the proboscis is black with the tip sometimes exserted.

The thorax is blackish with dorsal dark brown and black tomentum, and long stiff brown hairs in front; on each side above the wing insertions there is a stripe of whitish or brown hairs, which reaches from the humeral to the post-alar callus; the bristles are black; the scutellum is reddish-brown or light brown and has brown and black scales and long, black, marginal bristles.

The abdomen varies greatly in ground colour, the most usual colour being black with the three basal segments largely brownish laterally; the black in some species is reduced to a broad median stripe, which decreases in size apically; the dorsum is covered mainly with black scales with scattered black hairs; there are two spots or areas of white scales on each side of the third segment, the areas sometimes meeting to form a complete band; the sixth segment and apex are also covered with white scales; the lateral pubescence consists mainly of black hairs, though on the sides of the basal segments they may be replaced wholly or partly by whitish or yellowish hairs.

The legs are blackish-brown or brown and are clothed with black scales and hairs.

The wings are brown with the apex broadly hyaline and a large triangular, indented, hyaline area below, the apex of this area reaching to the upper border of the median cell; the size of this area appears to vary tremendously, being sometimes reduced to two irregular spots; there is a small greyish spot at the apex of the median basal cell; the cubital is sometimes narrowly open or closed at the wing border.

Length of body, 8.22 mm.; of wing, 9.5-21 mm. The female is similar.

*Hab.*—Queensland: Meringa, Pt. Denison, Rockhampton, Brisbane, Eidsvold, Chinchilla, Westwood; N. S. Wales: Toronto, Biniguy, Sydney, Cobar; W. Aust.: Swan River, Cue, Beverly, Northam, Cunderdin, Perth; N. Territory: Woodah, Katherine; and also from South Australia.

Under this name I have been compelled to place a number of specimens which vary very greatly in the general colour, size and pubescence. The various specimens appear to fall into three more or less distinct forms: (1) A very large form in which the lateral stripes on the thorax are white, the white scales on the third segment of the abdomen are confined to two distinct lateral areas, the brown of the wings is dark and the hyaline area at the inner margin is not completely triangular, i.e. the brown band does not reach the inner border, and its outline is rather distinct; (2) medium sized specimens, in which the lateral stripe of the thorax is usually brown, the white scales on the third abdominal segment form a definite band, and the brown of the wings is also dark, but the triangular hyaline area at the inner margin is complete; (3) specimens in which the triangular white spots of the abdomen are separate, the brown of the wings much lighter, the hyaline area at the inner margin much reduced, sometimes being diminished to two spots, the abdomen mainly brown, and the lateral tuft of hairs at the base of the abdomen whitish. It is possible that more than one species is represented here, but I have been unable to find definite characters for their separation, the three forms mentioned above being connected by intermediate forms.

## EXOPROSOPA STELLIFER Walker.

*Anthrax stellifer*, Walker, *List Dipt. Brit. Mus.*, ii, 1849, 244.—*Litorhynchus stellifer*, Walker, *Ins. Saund. Dipt.*, 1852, 166.—*Exoprosopa stellifer*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 47; 1923, 74.

♂. The head is blackish; the occiput is black or brownish with numerous short depressed black hairs and some brownish scales; the ocellar tubercle is black; the frons is black above, brownish below; the face is sharply prominent, brownish, but black on each side of the upper mouth border, both face and frons covered with dense black hairs and brown scales; the first two segments of the antennae are brown, covered with black hairs; the third is black, about as long as the first segment; the proboscis is black with brownish labella, slightly longer than the oral aperture; the palpi are slender and brown.

The thorax is black, with dense, thick, stiff, anterior brown and black hairs and a stripe of whitish hairs along each side extending from the humeral to the post-alar callus; the dorsum is covered with numerous upright and depressed black hairs and thinner, depressed, dark brown tomentum; the bristles are well developed and black; the scutellum is reddish-brown covered with black and brown scales and bearing black marginal bristles; the pleurae are blackish with tufts of stiff black hairs; the squamae are brown with a dark scaly fringe; the halteres are dark.

The abdomen is black with large reddish-brown lateral areas on the basal segments, covered with black scales and hairs; on each side of the third segment there is a triangular spot or area of white scales; the sixth and apical segments are also covered with white scales; laterally the first segment has a tuft of whitish hairs; the second, black hairs with which a few white hairs are mixed; all the rest have black hairs; the venter is mainly black, some of the apical segments being partly brown, with black scales and hairs.

The legs are brown, with somewhat darker tarsi, and covered with black scales and hairs.

The wings are dark brown with a broadly dull hyaline apex; the brown occupies the wing from the base to near the apex of the costal cell thence across to the apex of vein  $M_{3+4}$ ; cell  $R_5$  is open; the cubital is closed at the wing border; the brown contains five hyaline or greyish spots in relation to r-m,  $M_{3+4}$ , im and the median cell.

The female is unknown.

Length of body, 14-21 mm.; of the wing, 12.5-19 mm.

This species is apparently very rare, as I have only seen two specimens in the many collections examined; one in the Queensland Museum from Cunderdin, W. Australia, the other in the Macleay Museum, labelled West. Australia.

These two specimens are distinct from one of the groups of *adelaidica* in the amount of brown of the wing and in the position of the hyaline spots. In *E. adelaidica* the apical edge of the brown extends from the apex of the costal cell across the wing to colour the apical portion of cell  $M_1$  and most of the basal portion of cell 2nd  $M_2$ , while in *E. stellifer* the apical part of cell  $M_1$  is not so extensively coloured and the base of 2nd  $M_2$  is quite clear.

The position of the hyaline spots in the wing is also distinctive and even with a closing up of the large triangular hyaline area at the inner margin of the wing of *adelaidica*, no hyaline spots would be left around r-m or the basal part of  $M_{3+4}$ .



## EXOPROSOPA DIMIDIATA, n. sp.

♂. The head is black; the occiput is blackish and is clothed with short, depressed, black hairs and brownish scales; the post-vertical furrow is well marked and deep; the ocellar tubercle is blackish, prominent, and crowned with a few erect, short, black hairs; the frons is blackish, covered with erect, black hairs and brown scales; the face is sharply prominent, blackish, but somewhat brown on each side of the epistoma below the antennae, and covered with similar tomentum; the first two segments of the antennae are brownish-black, bearing long and short black hairs; the third is black with a style about half its length; the proboscis is black, and is slightly longer than the oral aperture; the eyes have a well marked indentation of the hind borders and a distinct bisecting line.

The thorax is blackish, clothed with erect black hairs and brown scales; in front there are stiff, dense, yellow brown hairs, and on each side above the wing insertion, there is a stripe of similarly coloured, but much shorter and more appressed hairs; the bristles are black; the scutellum is brown, somewhat darker medianly, and covered with light brown scales and bearing long, black, marginal bristles; the pleurae are provided with stiff black hairs; the squamae are dark, with a fringe of long, dark scales; the halteres are blackish with somewhat lighter knobs.

The abdomen is black, rather short, not as long as the thorax, and clothed mainly with black scales and hairs; there is a band of white scales on the third segment, the sixth and apical segments being also covered with white scales; on the sides the hairs are black, except near the base, where the hairs are dirty white; the venter is brown, clothed with black scales and hairs.

The legs appear to be uniformly black, and bear black scales and hairs.

The wings are rather stout, cut sharply into dark brown and hyaline halves, the inner margin of the brown extending from near the apex of the cubital cell across the wing to the apex of the subcostal cell; there is a greyish spot at the apex of the median basal cell; the bifurcation of  $R_{2+3}$  and  $R_{4+5}$  takes place opposite r-m; the terminal loop of  $R_{2+3}$  is well developed; cells Cu,  $R_5$ ,  $M_1$ ,  $M_2$  and  $M_4$  are all open.

Holotype male, Groote Eylandt, H. E. Warren. Length of body, 15 mm.; of wing, 13 mm. The holotype is unique and is in the South Australian Museum.

## Genus VILLA Lioy.

Villa, Lioy, *Atti Istit. Veneto*. (3), ix, 1864, 732.

Genotype, *Anthrax concinnus* Meigen, by original designation.

The head is large and globular, as broad as the thorax or almost so; the eyes are separated in both sexes, but wider apart in the female; the ocellar tubercle is rounded, prominent, and usually placed at the vertex of the head; the frons is raised, and in the male varies somewhat in its width at the vertex of the head, sometimes being but slightly broader than the ocellar tubercle, and again about two and a half times as broad; the face may be sharply or bluntly prominent, or rounded, both face and frons being usually covered with scales and hairs; the antennae are set well apart from each other at their base and are inserted somewhat above the middle of the front plane of the eyes; the first segment is cylindrical, about twice as long as the second; the third varies in shape from conical to subulate, the flagellate portion being very thin or rather stout; there is usually a minute spine present at its apex; the proboscis is short and thick and rarely projects beyond the epistoma to any extent; the palpi are small and slender.

The thorax is quadrate, broadest behind, flattened, and covered in front and on the sides with dense, stiff hairs; the pre- and post-alar bristles are usually well developed; the scutellum is broad and semicircular, and bears on its margin numerous bristles; the squamae are rather large with a fringe of scales, and the halteres are slender.

The abdomen is generally longer than the thorax, convex above and flattened below, sometimes broad and almost straight-sided; there are usually bands of scales on the dorsum and long hairs on the sides, especially near the base; the male genitalia are set on one side and the genitalia of the female are armed with a circlet of spines at the apex.

The legs are slender, of the usual form found in the Exoprosopinae, but the fore tibiae may sometimes bear small spines; there is no basal tooth on the claw.

The wings are strong, with the typical venation of the Exoprosopinae; the cell  $R_3$  is sometimes divided by an inter-radial vein; cells  $R_2$ ,  $M_1$ ,  $M_3$  and  $M_4$  are always open; the cubital cell is very rarely closed.

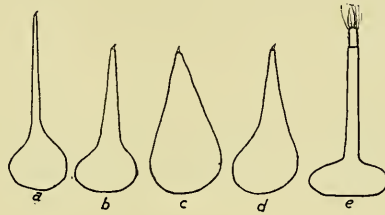
*Range*.—World-wide.

In the material under examination I have recognized thirty-one species as belonging to this genus, nineteen of which are described, eight being considered new. Bezzi recognized two genera, *Villa* and *Thyridanthrax*, into which these species might be placed, his characters for their separation being the presence or absence of minute spines on the fore tibiae, the roundness or convexity of the face, and the shape of the third antennal segment. *Fuscicostata* is a true species of *Villa* in possessing all these characters; *commista* has a rounded face, and a very slender third antennal joint, but the fore tibiae are devoid of spines. I have seen a new species in the Queensland Museum, not described in this revision, in which the fore tibiae possess distinct spines, but the face is sharply convex and the third antennal segment is rather stout. Most of the species I have placed in the genus possess one or two of these characters, but very rarely all of them. Bezzi, himself, admitted that the separation of the species of *Villa* and *Thyridanthrax* of the Ethiopian Region was extremely difficult, and the only constant character available was the presence or absence of spines on the fore tibiae. Even this character does not hold outside that region as there are species of *Villa* in America which have the fore tibiae absolutely devoid of spines. I am therefore strongly inclined to make *Villa* and *Thyridanthrax* synonymic, but refrain from doing so until I have an opportunity of seeing some exotic species of *Thyridanthrax*.

The separation and identification of the small species of this genus has been exceedingly difficult. There are apparently many small species that are extremely variable, and until further material is available, I do not intend to attempt to describe many of these species which do not appear valid. The small species described herewith are all represented by good series and are easily distinguished from each other.

The members of this genus are very small to rather large flies, prettily marked with yellow, brown and black tomentum, and with wings that are rarely completely hyaline, but usually brown at the base and along the fore margin to various depths. The adults, like the other genera of the subfamily, are particularly abundant in arid country, and obtain their food from the flowers of low growing shrubs and weeds. Little is known of the life histories, but two small species have been obtained from the cocoons of the Noctuid genera *Leucania* and *Agrotis*.

*Distribution.*—It is interesting to note that while the genera, *Hyperalonia* and *Exoprosopa*, are unknown from Tasmania, certain species of *Villa* are to be found there in abundance, three species, *minor*, *velox*, and *argentipennis*, being confined to that Island. New South Wales possesses five species, *quinqueguttata*, *brunea*, *varipennis*, *aprica*, and *fumea*, all of which will probably be found to have a more extensive range. The species limited to Queensland is *albobasalis* which, being a Western form, may also be represented in New South Wales, and possibly extends to Western Australia; *rava* occurs in both Queensland and New South Wales and *albata* in Western Australia only; *fuscicostata*, *simplex*, *nigricosta*, *alterna*, *pellucida*, and *vitrea* are all found in Tasmania and from there are gradually extending north and west.



Text-fig. 3. Third antennal segment of (a) *Villa commista* Macq., (b) *V. alterna* Walk., (c) *V. varipennis*, n. sp., (d) *Pseudopenthes fenestrata*, n. sp., and (e) *Anthrax maculata* Macq.

*Key to the Species of Villa.*

1. Wings spotted ..... *quinqueguttata*, n. sp.  
Wings not spotted ..... 2
2. Large species only, with smoky wings ..... 3  
Large and small species with the wings wholly or partly hyaline, small species with the wings somewhat smoky ..... 4
3. Abdomen with a narrow band of white scales on the fourth segment and a narrow band of brown scales on the third ..... *alterna* Walker  
Abdomen with a broad band of white scales on the fourth segment, third segment with black scales only ..... *fumea*, n. sp.
4. Small species with the wings brown or smoky, but clearer at the apex; cell  $R_3$  divided by a crossvein ..... *varipennis*, n. sp.  
Species with the wings not as above; cell  $R_3$  rarely with a crossvein ..... 5
5. Wings clearly divided into a basal brown half and an apical hyaline half ..... 6  
Wings hyaline, or at most brown at the base and along the fore border ..... 7
6. Basal half of wings dark brown; thorax with reddish or yellowish hairs in front and on the sides; fourth segment of abdomen with a large triangular area of white scales on each side ..... *commista* Macquart  
Basal half of wings light brown; thorax with brown hairs in front and on the sides; fourth segment of abdomen with a complete but narrow band of white scales ..... *obscura* Macquart
7. Species with wings completely hyaline, or brown at the base and along the fore margin, the colour rarely extending past the bifurcation of the veins  $R_{2+3}$  and  $R_{4+5}$ \* ..... 8  
Species with wings brown at the base and along the fore margin, the colour extending to or past the bifurcation of the veins  $R_{2+3}$  and  $R_{4+5}$  ..... 16
8. Wings hyaline or at most tinged brown at the base and along the course of the closely adjacent veins  $Sc$  and  $R_1$  ..... 9  
Wings brown at the base and along the fore margin ..... 12
9. Face covered with white scales, a small species ..... *trivinctula*, n. sp.  
Face covered with brown scales ..... 10



10. A very small species with completely hyaline wings and the body possessing erect white hairs ..... *albata*, n. sp.  
 A small species with the wings tinged brown at the base only, thorax clothed with white hairs; abdomen with brown and white scaly bands .... *minor* Macquart  
 Thorax clothed with brown or yellow-brown hairs; wings tinged brown at the base and along the course of the closely adjacent veins Sc and R<sub>1</sub> ..... 11
  11. Thorax with brown and a few whitish hairs; frons in male rather broad at the vertex ..... *brunea*, n. sp.  
 Thorax with yellow-brown hairs; frons in male rather narrow at the vertex .....  
 ..... *vitrea* Walker
  12. Abdomen rather broad, its lateral pubescence being almost unicolorous to the middle of the third segment at least; fore tibiae with distinct spines; a large species ..... *fuscicostata* Macquart  
 Abdomen not very broad; its lateral pubescence extending at most unicolorous to the posterior border of the second segment; fore tibiae with hairs only ..... 13
  13. A medium-sized species, with the wings brown at the base and for a short distance along the fore margin ..... *albobasalis*, n. sp.  
 Small species with the wings conspicuously brown at the base and along the fore margin ..... 14
  14. Face covered with white scales ..... *simplex* Macquart  
 Face covered with brown scales ..... 15
  15. First segment of abdomen with white scales; the brown of the fore margin rather light ..... *nigricosta* Macquart  
 First segment of abdomen with black and brown scales; the fore margin of the wing dark brown ..... *pellucida* Walker
  16. Thorax with some white hairs on the shoulders; a rather small species .....  
 ..... *argentipennis* White  
 Thorax with brown or yellow-brown hairs; shoulders without white hairs ..... 17
  17. Hairs on each side of the base of the abdomen, white ..... 18  
 Hairs on each side of the base of the abdomen, yellowish ..... *velox* White
  18. Face covered with white scales; abdomen with narrow brown bands .. *aprica*, n. sp.  
 Face covered with brownish scales; abdomen with broad brown bands .. *rava*, n. sp.
- \* Note.—In *pellucida* the bifurcation of R<sub>2+3</sub> and R<sub>4+5</sub> is sometimes tinged brown.

#### VILLA FUSCICOSTATA Macquart.

*Anthrax fuscicostata*, Macquart, *Dipt. Exot.*, suppl. 1, 1846, 111; Schiner, *Reise Novara*, 1868, 125; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 49.—*Anthrax marginata*, Walker, *Ins. Saund. Dipt.*, 1850, 178; White, *Proc. Roy. Soc. Tasm.*, 1916, 210.

♂. The head is black; the occiput is black, covered with somewhat whitish scales; the frons is black, slightly broader than the ocellar tubercle at the vertex, clothed with numerous erect black hairs and some yellow-white or brownish scales, the latter being more conspicuous on its lower half; the face is also black, rounded, and covered with dense yellow-white or brownish scales, with which are mingled a few black hairs; the antennae are entirely black, the third segment thinly attenuated and much longer than the first and second segments together; there is a minute spine at its apex; the proboscis is black, stout, and not longer than the oral aperture; the eyes possess a well marked indentation at their hind borders and a long and distinct bisecting line.

The thorax is blackish, with long, dense, whitish to brownish anterior and lateral hairs, and some brown and black scales on the dorsum; above the wing insertions there is a patch or stripe of hairs almost whitish in colour; the bristles are well developed and black; the scutellum is blackish or sometimes dark brown, covered with brown and black scales and bearing long, black, marginal bristles; the pleurae are partly covered with whitish or brownish tufts of hairs; the halteres are brown with whitish knobs.

The abdomen is broad, somewhat straight-sided, flattened, and clothed on the dorsum with white, brown, and black pubescent bands, the white bands being placed on the second, fourth and sixth segments, and the brown bands on the third and fifth segments; with these bands the bands of black scales alternate; the apex is covered with white scales; there is a long whitish to yellowish lateral growth of hairs extending from the base to the middle of the third segment, sometimes even further, the hairs on the sides of the other segments being mixed black and white; the venter is clothed with thin white pile.

The legs are black, covered with brownish scales and black hairs; the fore tibiae bear distinct, though rather weak spines.

The wings are hyaline with the base and fore margin brown; the brown never, or very rarely, covers the bifurcation of the veins  $R_{2+3}$  and  $R_{4+5}$ ; cell  $R_3$  never divided.

The female is very similar with a much broader frons.

Length of body, 8-14 mm.; of wing, 8-15 mm.

*Hab.*—Queensland: Palm Is., Pt. Denison, Westwood, Brisbane, Chinchilla; N. S. Wales: Moonie Rv., Moree, Sydney, Jindabyne, Barrington Tops, Wentworth Falls, Piper's Flats, Toronto, Mt. Kosciusko; S. Australia: Blackwood, Eyre Penin.; W. Australia: Beverly, Ulan; N. Territory: Metah; Tasmania: Hobart, George Town.

Two specimens collected by A. P. Dodd on the Moonie River in New South Wales are somewhat different from the other members of the series. They have a generally broader abdomen and the long hairs at its sides are almost completely whitish to the apex, very few black hairs showing. Other specimens have the general pubescence more yellowish than white, but the colour is probably due to age, as they were all very old specimens.

#### VILLA COMMISTA Macquart.

*Anthrax commista*, Macquart, *Dipt. Exot.* suppl. 4, 1850, 109; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 48.—*Anthrax consimilis*, Thomson, *Eugenies Resa*, *Dipt.*, 1868, 481.—*Anthrax albirufa*, Walker, *Trans. Ent. Soc. London*, iv, 1857, 143.

♂. The head is black; the occiput is black covered with whitish scales; the frons is black, clothed for the main part with erect black hairs; the face is black, covered with brown scales, which become yellowish-white on each side and extend half way up the frons; the antennae are black with dense black hairs at their base; the third segment is thinly subulate, with a very minute terminal spine; the proboscis is black, stout, and does not project beyond the epistoma; the eyes are separated at the vertex of the head by slightly more than the width of the ocellar tubercle, and possess a well marked indentation of the hind borders and a long and distinct bisecting line.

The thorax is black, covered dorsally with black and brown scales, the latter forming three indistinct longitudinal stripes; the anterior and lateral pubescence consists of long, dense, yellow, reddish, or orange hairs; there are traces of thin hairs of the same colour immediately anterior to the scutellum; the bristles are well developed and black or brown; the scutellum is black covered with yellow and black scales and bearing long brown and black marginal bristles; the pleurae are covered with long yellow or orange hairs, and below the wing insertions there are some clear white hairs; the squamae are dark with a fringe of yellow scales; the halteres are brownish.

The abdomen is rather broad, somewhat similar to that of *fuscicostata*, blackish-brown and clothed mainly with black scales and hairs; there is a very narrow band of whitish or light brown scales on the second segment and two distinct areas of white scales on each side of the fourth; the apex is covered with white scales; on each side of the base there is a tuft of clear white hairs which extend to the middle of the second segment; the hairs on the sides of the other segments are black. The venter is clothed with thin silky white pile with a broad black apical band.

The legs are black, clothed with shining black scales and black hairs; the fore tibiae are devoid of spines.

The wings are divided into a dark brown basal half and an apical hyaline half, the dividing line extending from near the apex of the cubital cell to the apex of the costal cell, leaving the lobe and the interior of the cubital cell more or less hyaline; there is a greyish spot at the apex of the median basal cell; cell  $R_2$  never divided by a crossvein.

The female is similar, except that the frons is broader between the eyes. Length of body, 10-15 mm.; of wing, 10.5-16 mm.

*Hab.*—Q'land: Pt. Denison, Rockhampton, Brisbane, Caloundra; N. S. Wales: Gosford, Sydney, Port Hacking, Piper's Flats; W. Australia: King George's Sound.

In Hardy's catalogue, *Anthrax albirufa* had been listed as a synonym of *Anthrax fuscicostata*, but I think Walker's description fits *commista* more readily.

In the series of this species under examination, there are three specimens in which the white areas on the sides of the fourth segment of the abdomen are extended so as to meet, forming a band which is extremely narrow medianly. The dense hairs on the front and sides of the thorax are usually a beautiful orange, but in a rather small specimen, collected in Brisbane, these hairs are more yellow than orange.

#### VILLA OBSCURA Macquart.

*Anthrax obscura*, Macquart, *Dipt. Exot.*, suppl. 1, 1846, 112.

♂. The head is blackish; the occiput is dull black-brown with brownish scales, which become whitish, laterally; the postvertical furrow is well marked and deep; the ocellar tubercle is shining black and is crowned with a few erect black hairs; the frons is blackish, narrow at the vertex, and clothed with numerous black hairs, and on the basal half with some brown scales; the face is black, prominent, and covered with black hairs and dense, light brown scales; the antennae are entirely black, with long stiff, black and brown hairs on the first segment, and with short black hairs on the second; the third segment is longer than the first two together, with a rather stout styliform portion which terminates in a very minute spine; the proboscis is short and black; the eyes have a well marked indentation at their hind borders and a long and distinct bisecting line.

The thorax is blackish, with dorsal dark brown, depressed tomentum, and long dense anterior and lateral light brown hairs; the bristles are mainly brownish, but a few are black; the scutellum is brown or reddish-brown, blackish basally, covered with dark brown and black scales and bearing long, thin, marginal bristles; the pleurae are furnished with tufts of long whitish-brown hairs; the squamae are brownish with a fringe of brown scales; the halteres are yellowish with whitish knobs.

The abdomen is blackish, with brownish lateral areas on segments one to four, the areas decreasing in size apically; the first segment is covered with black



tomentum and sparse brownish hairs, the second with a white anterior, a median brown and a posterior black band, the third mainly with brown scales, the fourth, with an anterior white and a posterior black band, the fifth mainly with brown scales, and the sixth and apical segments with white scales; the hairs on each side of the first segment are clear white and extend for two-thirds of the second segment; the remaining segments bear mostly black hairs laterally; the venter is brownish, covered with thin white pile.

The legs are mainly brown covered with brown scales and black hairs; the fore tibiae are devoid of spines.

The wings are hyaline with the base, the fore margin for two-thirds the length and one-half the breadth, light brown; the apex and hind margin are clear, so that the basal half of the wing is brown and the apical half hyaline; there is a hyaline or greyish spot at the apex of the median basal cell; the cubital cell and  $R_2$  are open.

The female is similar.

Length of body, 9-13 mm.; of wing, 8-12.5 mm.

*Hab.*—Q'land: Westwood, Eungella Range, Brisbane, Chinchilla; N. S. Wales: Forbes, Murrurundi, Sydney, Gravesend; W. Australia: Beverly, Swan Rv. There are two specimens labelled South Australia only.

This species was particularly common at Gravesend, North-west New South Wales, during March, 1927, when no less than twenty-eight specimens were taken in two days. In one specimen from this locality, the brown of the wings is not sharply separated from the hyaline portion, so that the wings appear suffused with brown throughout their width.

In two others, the brown of the wings is diffused from the base only to a very small extent, so that the wings are not divided into equal, or nearly equal, brown and hyaline halves.

#### VILLA MINOR Macquart.

*Anthrax minor*, Macquart, *Dipt. Exot.*, suppl. 4, 1850, 11; White, *Proc. Roy. Soc. Tasm.*, 1916, 208; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 49; 1923, 75.

♀. The head is black; the occiput is black covered with brown scales; the frons is black, covered with erect black hairs and brown scales, the latter more dense towards the antennae; the face is more or less rounded, not very prominent, clothed with black hairs and brown scales; the antennae are entirely black, the third segment thinly attenuated and with a minute terminal spine; the proboscis is stout and black and is concealed within the oral aperture; the eyes have a well marked indentation of the hind borders and a fairly distinct bisecting line.

The thorax is black, with dense white hairs in front and on the sides, and brown scales and some black hairs dorsally; the white hairs are continued in an almost unbroken line round the thorax and close to the scutellum; the bristles are black; the scutellum is black, covered with brown scales and bearing thin, short, black, marginal bristles; the pleurae are furnished with white hairs above, and brownish hairs below; the squamae are dark, with a short fringe of white scales; the halteres are pale brown with blackish knobs.

The abdomen is black, somewhat slender, and clothed with broad white and narrow brown scaly bands, the white bands being on the first, second, and fourth segments; the apex is also clothed with white scales; the brown bands are placed on the second, third, fourth, fifth, and sixth segments; the hairs on each side of the basal segment are white and extend a little distance past the

anterior border of the second segment; the venter is mainly brown, with similar bands of white and brown scales.

The legs are mainly brown, with rather darker femora and tarsi, covered with brown scales and black hairs; the fore tibiae bear hairs only.

The wings are completely hyaline except for the base which is tinged brown.

Length of body, 8 mm.; of wing, 6.5 mm.

The description is taken from two females in the collection of Mr. G. H. Hardy, taken in Tasmania at Dunalley and Mangalore respectively.

#### VILLA ALTERNA Walker.

*Anthrax alterna*, Walker, *List Dipt. Brit. Mus.*, ii, 1849, 261; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 48.—*Anthrax alternans*, Macquart, *Dipt. Exot.*, suppl. 4, 1850, 110; White, *Proc. Roy. Soc. Tasm.*, 1916, 208.

♂. The head is black; the occiput is blackish, covered with depressed black hairs and brown scales; the frons is black, with numerous erect black hairs and some brown scales on its lower half; the face is blackish, prominent, covered with brown scales and some black hairs; the antennae are entirely black, the third segment with a somewhat stout styliform portion and a minute terminal spine; the proboscis is black, and does not project beyond the epistoma; the hind borders of the eyes have a well marked indentation and a long and distinct bisecting line.

The thorax is brownish-black, covered dorsally with black and brown scales, the brown scales forming three well defined longitudinal stripes; there are some whitish hairs above the wing insertions, and also immediately anterior to the scutellum; the hairs in front and on the sides are brownish; the scutellum is brownish, covered with brown and black scales and provided with long, black, marginal bristles; the pleurae have a somewhat whitish tuft of hairs above, and brownish or reddish hairs below; the squamae are blackish with a fringe of white scales; the halteres are brownish with pale knobs.

The abdomen is mainly blackish, with bands of white scales on the second, fourth, sixth and apical segments and of brown scales on the second, third, fourth, fifth, and sixth segments, the bands on the third and fifth segments being particularly broad; the rest of the dorsal tomentum consists of black scales and a few black hairs; on each side of the first segment are some dirty white hairs, and on the anterior half of the second, clear white hairs; the lateral pubescence of the other segments is composed mainly of black hairs; the venter is covered with brown and white scales and hairs.

The legs are blackish or brownish, covered with shining brown scales and black hairs; the fore tibiae are devoid of spines.

The wings are suffused with brown, the colour being more marked at the base and along the costal border for two-thirds the length and half the breadth, leaving the apex and inner margin somewhat clearer, but not quite hyaline; cell  $R_3$  without an interradiial.

The female is similar.

Length of body, 10-12 mm.; of wing, 9-11 mm.

*Hab.*—Q'land: Brisbane, Chinchilla; N. S. Wales: Barrington Tops, Camden, Piper's Flats; Sth. Australia: Franklin's Is.; W. Australia: Mundaring, Swan Rv.; Tasmania: Hobart, Launceston.

The abdomen appears to vary slightly in ground colour. In two specimens there are lateral brown areas on all the segments; in some these brown areas are

confined to the first and second segments and in others the abdomen may appear uniformly blackish.

VILLA VELOX White.

*Anthrax velox*, White, *Proc. Roy. Soc. Tasm.*, 1916, 211; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 50.

♂. The head is black; the occiput is black, covered with black or dark brown scales; the frons is black, clothed with numerous black hairs and some brown scales near the antennae; the face is prominent, black, and covered with dense brown scales and black hairs, the brown scales are rather light, and in certain lights appear whitish; the antennae are entirely black, the third segment with a stout styliform portion, which ends in a minute spine; the proboscis is black, and generally slightly longer than the oral aperture.

The thorax is black, clothed dorsally with brown and black scales and hairs, and in front and on the sides with thick yellow-brown hairs, which are somewhat paler above the wing insertions; the scutellum is black with black and brown scales, the latter more or less confined to the margin, and bearing long black marginal bristles; the pleurae are also provided with yellow-brown hairs; the squamae are dark with a fringe of yellowish scales; the halteres are dark.

The abdomen is black, with dorsal black scales and hairs and brown and white scaly bands, the brown bands being on the second, third, fourth, and fifth segments and the white bands more prominent on the second and fourth; on each side of the basal segment there is a tuft of yellowish hairs which become dirty white on the second; the venter is black, clothed with brown and white scales and hairs.

The legs are brownish or black-brown covered with black and brown scales and hairs; the fore tibiae are sometimes provided with distinct though very minute spines.

The wings are hyaline, but not glistening, with the base and the costal border for two-thirds its length, dark brown; the colour includes the vein r-m, and tinges the apical portion of the median basal cell.

The female is similar.

Length of body, 8-11 mm.; of wing, 7-9 mm.

*Hab.*—Cradle Mt., Tasmania.

There are seventeen specimens in the collection of Mr. G. H. Hardy, all from the same locality, and another specimen in the Australian Museum also from Cradle Mt. White's description was taken from a male 13 mm. in length. No specimen in the series examined is as large, a single specimen being 11 mm. long, most of the others varying from 8-10 mm.

VILLA VITREA Walker.

*Anthrax vitrea*, Walker, *Ins. Saund. Dipt.*, 1850, 181; White, *Proc. Roy. Soc. Tasm.*, 1916, 208; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 49.

♂. The head is black; the occiput is black, with light brown or whitish scales, and some short black hairs; the frons is black, very narrow toward the head vertex and clothed above with erect black hairs, and below with dense silver white scales which become detached very easily; the face is lightly prominent, black, clothed with brown scales which have whitish reflections; the antennae are entirely black, the third segment with a slender styliform part, which ends in a



minute spine; the proboscis is black and stout and does not project beyond the epistoma.

The thorax is black, with thick yellowish or yellow-brown anterior and lateral hairs, the latter somewhat lighter above the wing insertions and dorsal black and brown scales and black hairs; the bristles are mainly yellow or brown; the scutellum is black, covered with brown and black scales and bearing black marginal bristles; the pleurae are provided with yellow or yellow-brown hairs; the squamae are blackish, though rather light, with a fringe of yellowish-white scales; the halteres are brown with yellow knobs.

The abdomen is black, with white bands on the second and fourth segments and brown bands on the other segments; the apex is covered with brown scales; the hairs on each side of the basal segment are yellowish or dirty white and extend as clearer white hairs to the posterior border of the second segment; the venter is black, clothed with black and brown scales and black hairs.

The legs vary somewhat from black to brown, and are covered with black and brown scales and black hairs; the fore tibiae are devoid of spines.

The wings are hyaline, light brown at the base and along the course of the closely adjacent veins, Sc and R<sub>1</sub>.

In the series before me the females possess brown scales only on the lower half of the frons, the silver white scales seen in the male being apparently absent. I would like to see some more specimens before I record this as a sexual character, as these scales are very easily rubbed off, and are absent in many of the males.

Length of body, 6-8 mm.; of wing, 5-7.5 mm.

*Hab.*—Q'land: Brisbane, Stradbroke Is.; N. S. Wales: Sydney, Blue Mts., Collaroy; W. Australia: Perth; Tasmania: Hobart, Cradle Mt.

In his revision of the Bombyliidae of Tasmania, White recorded *Anthrax vitrea* as synonymic with *Anthrax minor*, but made no remarks concerning it. This species, *vitrea*, was described by White in his revision under the name *Anthrax nigricosta*, but I am satisfied that his identification of *nigricosta* was not correct, as the species he described as *simplex* agrees more readily with Macquart's description.

#### VILLA BRUNEA, n. sp.

♂. The head is black; the occiput is dull black with abundant brownish scales, which are somewhat more dense near the hind indentations of the eyes; the ocellar tubercle is black and prominent, crowned with a few erect black hairs; the frons is black, rather broad at the vertex, and clothed with dense black hairs and brown scales which are more conspicuous near the antennae; the face is conical, black, and densely covered with brown scales and some black hairs; the antennae are entirely black; the first segment is twice as wide at its apex as at its base, with the inner apical angle sharply acute, the whole being clothed with brown and black hairs; the second segment is about half as long as the first, bearing short black hairs; the third is longer than the first and second together, the basal discoidal portion about as long as the second segment, but not as wide; the styliform part is rather stout and has a minute spine at the apex; the proboscis is stout and black, and is concealed within the oral aperture; the hind indentation and the bisecting line of the eyes are both well marked.

The thorax is black, finely punctate, covered dorsally with brown scales and some whitish depressed hairs, and bearing in front and on the sides long, dense, light brown hairs; the bristles are rather weak, the pre-alars being yellowish and

the post-alars black; the scutellum is black, covered with brown scales and provided with black bristles on the margin; the pleurae are grey dusted and bear brownish hairs, which become somewhat whitish below the wing insertions; the squamae are yellowish with a fringe of white hairs; the halteres are also yellowish with pale knobs.

The abdomen is black, not as long as the head and thorax, with bands of white scales on the second and fourth segments and white scales on the apex; the remainder of the dorsum is covered with brown scales and some brown and black hairs; laterally there is a brown or dirty white tuft of hairs on each side of the basal segment, the hairs extending to the middle of the second segment; the other segments have traces of white scales on the sides; the venter is blackish, covered with white and brown scales and hairs.

The legs are black, covered with shining brown scales and brown and black hairs; the fore tibiae are provided with hairs only.

The wings are strong, hyaline and glistening, tinged brown at the base and along the course of the closely adjacent veins, Sc and  $R_1$ ; the terminal loop of  $R_{2+3}$  is well developed; the median cell is rather broad, with r-m placed before its middle;  $R_4$  possesses a small appendix; cell  $R_5$  without an interrarial crossvein.

Holotype male, Gravesend, N.S.W., 27th March, 1927, F. Roberts. Length of body, 7 mm.; of wing, 6.5 mm. The female is similar, with the eyes much farther apart at the head vertex.

Allotype female, Gravesend, N.S.W., 27th March, 1927, F. Roberts. Length of body, 6.5 mm.; of wing, 6 mm.

There are fifteen paratypes (8 ♂, 7 ♀) in the author's collection, all taken at Gravesend during March, 1927. The frons of the male is much broader than usual at the vertex, and is about twice or more than twice the width of the ocellar tubercle. Usually in the males of the genus, the eyes are separated at the vertex of the head by little more than the breadth of the ocellar tubercle. In the paratypes the venation is slightly variable, and appendices, especially on  $R_4$ , are present or absent; in one specimen, the appendix is produced so that a small rectangular extra cell is formed.

The holotype and allotype are in the Queensland Museum.

#### VILLA TRIVINCULA, n. sp.

♀. The head is black; the occiput is black, covered with silvery white scales, which are more dense near the hind indentations of the eyes; the ocellar tubercle is black and prominent; the face is rounded, and is covered with silvery white scales which extend up the inner margins of the eyes for about half the depth of the frons, which is also black, and bears numerous erect black hairs; the antennae are entirely black, the first segment with stiff black hairs outwardly and long silvery white scales inwardly; the third segment has a rather thick styliform portion which has a minute apical spine; the proboscis is black and is concealed within the oral aperture; the hind indentations and bisecting line of the eyes are both well developed.

The thorax is somewhat shining black and is covered dorsally with shining black scales and black hairs; in front and on the sides the hairs are dense and white, and there are patches of almost golden hairs above the wing insertions; the bristles are well developed and black; the scutellum is black and is covered

with black scales and bears long, black, marginal bristles; the pleurae are blackish, rather bare, and provided with white and brown hairs; the squamae are light brown and have a fringe of short white scales; the halteres are dark.

The abdomen is black, longer than the thorax, practically straight sided and broadest at the sixth segment; the dorsum is covered with black scales and hairs, but on the anterior border of the second segment there is a narrow band of white tomentum, and on the posterior borders of the fourth, fifth, and sixth segments there are narrow bands of silvery white scales, which also cover the apex; the sides of the first, second and third segments bear long, dense, whitish hairs, which are longer and more dense on the first; the venter is black, and is covered with white and black scales and hairs.

The legs are mainly blackish, clothed with black scales and hairs; the femora have some white scales below and there are a few very minute spines on the fore tibiae.

The wings are hyaline, but light brown at the base and along the course of the closely adjacent veins, Sc and  $R_1$ ; the bifurcation of  $R_{2+3}$  and  $R_{4+5}$  takes place opposite r-m; cell  $R_3$  is undivided.

Holotype female, Brisbane, 13th November, 1923, L. Franzen. Length of body, 8.5 mm.; of wing, 8 mm. Allotype male, Sydney, 2nd February, 1919, G. H. Hardy. Length of body, 8 mm.; of wing, 7.8 mm.

The male is similar to the female, except for the width of the eyes at the head vertex.

Two paratypes are known, H. Hacker, Brisbane, 16th November, 1925, a male, and L. Franzen, Brisbane, 13th November, 1923, a female. The holotype, allotype, and paratypes are in the Queensland Museum.

#### VILLA PELLUCIDA Walker.

*Anthrax pellucida*, Walker, *Ins. Saund. Dipt.*, 1854, 181; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 49.

♂. The head is black; the occiput is black, covered with brown or brownish-yellow scales, which are somewhat darker near the post-vertical furrow; the frons is slightly broader at the vertex than the ocellar tubercle, and is black, covered with dark brown scales and black hairs; the face is bluntly prominent, with similar dark brown scales, and somewhat depressed black hairs; the antennae are entirely black, the first and second segments being clothed with long and short black hairs; the third segment is subulate or elongate conical, and is furnished with a minute apical spine; the proboscis is black, and entirely concealed within the oral opening; the hind indentation of the eyes is rather weak, but the bisecting line is long and distinct.

The thorax is blackish, covered dorsally with dark brown scales and black hairs; the collar consists of stiff light brown or dirty white hairs, and on the shoulders are some clearer white hairs which extend to a point almost directly above the wing insertions; the bristles are well developed and black; the scutellum is blackish, covered with dark brown scales and bearing weak black bristles; the pleurae are furnished with sparse reddish hairs, the squamae are brownish with a brown fringe; the halteres are light brown.

The abdomen is black, and is covered dorsally with brown, white, and black scales, arranged in bands, and some black hairs; there are white bands on the anterior borders of the second and fourth, and brown bands on the second, medianly, the third, anteriorly, the fourth, medianly, and the fifth and sixth,



posteriorly; the apex is also provided with some white scales; on each side of the first segment the hairs are clear white and extend to the middle of the second segment, the remainder are provided with sparse black hairs; the venter is black, clothed with dark brown scales and black hairs.

The legs are mainly black, but are sometimes tinged brown, and are covered with brown scales and black hairs, the scales in certain lights having whitish reflections; the fore tibiae are provided with hairs only.

The wings are hyaline, but dark brown at the base and along the fore margin for two-thirds its length; the apex of the subcostal cell is hyaline or only faintly brown; the brown of the fore margin never descends to the bifurcation of veins  $R_{2+3}$  and  $R_{4+5}$ , though this bifurcation may sometimes be faintly tinged; the shoulders are provided with silvery white scales.

The female is similar.

Length of body, 3.6 mm.; of wing, 3.5-6.5 mm.

*Hab.*—Q'land: Brisbane, Peel Is.; N. S. Wales: Sydney, Woodford, Blue Mts., National Park (Gundamain); Tasmania: Hobart.

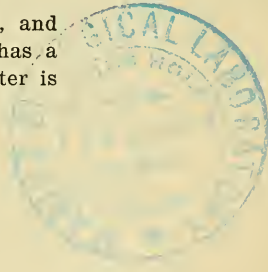
Hardy has recorded *pellucida* as a synonym of *nigricosta*. There is a single specimen of *pellucida* in his own collection from the type locality, Tasmania, and the discovery of other specimens from Queensland and New South Wales rather strengthens the distinctiveness of the two species.

#### VILLA VARIPENNIS, n. sp.

♂. The head is black; the occiput is black, bearing brown scales, which become somewhat darker around the post-vertical furrow, which is well developed and deep; the ocellar tubercle is large, rounded, and black; the frons is black, covered with erect black hairs and brown scales, the latter being more conspicuous on its lower half; the face is prominent, black, and clothed with brown scales and black hairs; the antennae are entirely black; the first segment is covered with stiff black hairs and at the vertex is half as broad again as at the base, the inner apices almost touching; the second is short, about one-half the length of the first; the third is conical and, at the base, about as broad as the second, the whole being as long as the first two together, and gradually tapering so that at the apex it is half as broad as at the base; there is a distinct but minute spine; the proboscis is concealed within the oral aperture; the palpi are slender, brown, and fairly elongate; the eyes are separated at the vertex by about twice the width of the ocellar tubercle, and have a well developed hind indentation and bisecting line.

The thorax is black, finely punctate, and covered dorsally with dark brown and black scales, the brown scales apparently being more or less confined to a large basal area, from which they extend towards the head as two indistinct stripes; the anterior and lateral hairs are whitish or light brown; the bristles are rather weak and brown; the scutellum is black, covered with brown or reddish scales with which numerous black scales are mingled, and provided with thin brown marginal bristles; the pleurae are black, bearing brownish hairs; the squamae are obscure brown with a fringe of short white hairs; the halteres are light yellow with somewhat whitish knobs.

The abdomen is black, rather stout, as long as the head and thorax, and clothed with bright brownish scales and brown hairs; the basal segment has a thin white pubescent band, which extends laterally as a white tuft; the venter is black and is also covered with brown scales.



The legs are blackish, the fore tibiae brownish basally, and covered with brown scales; the fore tibiae are provided with hairs only.

The wings are broad, with a well developed lobe and alula; they are yellowish at the base, the rest of the wing being dark brown with a clearer apex; there is a greyish spot at the apex of the second basal cell; the cell  $R_3$  is divided by a crossvein;  $R_{2+3}$  has a well developed terminal loop.

Holotype male, Gravesend, N.S.W., March, 1927. F. Roberts. Length of body, 5.5 mm.; of wing, 5 mm. Allotype female, Gravesend, N.S.W., March, 1927, F. Roberts. Length of body, 5.2 mm.; of wing, 4.8 mm.

The female differs from the male in the greater width of the frons at the head vertex, and in the colour of the wings, which are not dark brown, but somewhat smoky, with a clearer apex and hind margin.

There are thirteen paratypes (8 ♂, 5 ♀) in the author's collection, all taken at Gravesend in March, 1927, and five in the collection of Mr. J. Mann from Biniguy (November, 1923). In some of the specimens there are traces of white scales on the sides of the second, third, and fourth abdominal segments, and of an indistinct white scaly band across the fourth segment. In one specimen there is a small, triangular extra cell in cell  $R_3$ .

#### VILLA APRICA, n. sp.

♂. The head is mainly black; the occiput is black, covered with very small brown scales, which appear whitish in certain lights; the post-vertical furrow is well developed and deep; the frons is black, slightly broader than the ocellar tubercle at the vertex, and clothed with dense, erect, black hairs and brown scales, the latter more conspicuous on the lower half; the face is only slightly prominent, black, and covered with white scales, which are stained slightly yellow between the antennal base and the upper mouth borders, and more yellowish on each side; the ocellar tubercle is brownish and prominent; the antennae are entirely black, the first segment about twice as long as the second and bearing numerous white scales at its base, and long black hairs on its surface; the third segment is somewhat conical, but rather swollen at one-third from its base, not as broad as the second, but much longer than the first and second together, and provided with a minute apical spine; the proboscis is entirely concealed within the oral opening; the eyes possess a well developed hind indentation and a long and distinct bisecting line.

The thorax is blackish, and bears stiff anterior and lateral brownish hairs, and is covered dorsally with brown and black scales, the brown scales being more conspicuous immediately anterior to the scutellum, from whence they extend forward as three indistinct stripes; there is also a patch of brown scales placed above the wing insertions; the bristles are well developed and black; the scutellum is black, covered with black and brown scales, the brown scales being confined to the margin, which also bears well developed black bristles; the pleurae are furnished with tufts of brownish hairs, and beneath the wing insertions there are some soft white hairs; the squamae are dark, with a fringe of yellowish hairs; the halteres are tinged black, with yellowish knobs.

The abdomen is black-brown, almost parallel sided, about twice as long as its greatest width, with a truncated tip; there are bands of white scales on the anterior border of the second segment, which is broad and somewhat dilated laterally, on the anterior border of the fourth, the posterior border of the sixth, and on the apex; there are narrow brown bands on the second segment medianly,

the third anteriorly, and much broader bands on the posterior halves of the fifth and sixth; the remainder of the dorsum is covered with black scales, with some black hairs present apically; on each side of the basal segment are some soft, clear white hairs, which extend to the posterior edge of the white band on the second segment; the venter is brownish with some thin white pile basally, otherwise covered with brown scales and hairs.

The legs are mainly brownish, with the fore femora black for the basal two-thirds, and somewhat darker tibiae and tarsi, and are covered with black scales above and brown below; the fore tibiae are furnished with hairs only.

The wings are hyaline, but brown at the base and along the fore margin to the apex of the subcostal cell, the colour descending to the bifurcation of the veins  $R_{2+3}$  and  $R_{4+5}$ ;  $R_{2+3}$  originates a little anterior to r-m; the contact of cell  $M_1$  with the median cell is only half the contact of cell 2nd  $M_2$ ; the cubital cell is broadly open; cell  $R_5$  is undivided.

Holotype male, National Park (Gundamain), N.S.W., 14th February, 1926, I. M. Mackerras. Length of body, 10.5 mm.; of wing, 8.5 mm. Allotype female, National Park (Gundamain), N.S.W., 14th February, 1926, I. M. Mackerras.

The female is similar to the male.

There are seven paratypes (6 ♂, 1 ♀) in Dr. Mackerras's collection, all taken at Gundamain, National Park, Sydney, on 14th February, 1926.

There are two specimens (♂, ♀), collected by Mr. A. J. Nicholson at Woy Woy on 8th May, 1924, which are somewhat different from the holotype and allotype. In these two specimens, the hairs clothing the sides and front of the thorax are more whitish than brown, the fore femora are almost uniformly brown, and the femora of all the legs are covered beneath with white scales. They are also of much larger size. There is a much smaller male (Blackheath, 24th November, 1919) in the collection of Mr. G. H. Hardy, in which the face is mainly light brown in colour. The holotype and allotype are in the collection of the Macleay Museum.

I have seen three specimens which possess distinct, though minute, spines on the fore tibiae.

#### VILLA NIGRICOSTA Macquart.

*Anthrax nigricosta*, Macquart, *Dipt. Exot.*, Suppl. 4, 1850, 111; Froggatt, *Austr. Ins.*, 1907, 296; White, *Proc. Roy. Soc. Tasm.*, 1916, 209; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 49.

♂. The head is mainly blackish; the occiput is blackish, bearing small, appressed, black hairs and brown scales, the latter appearing whitish near the hind indentations of the eyes; the frons is black, about once and one half the width of the ocellar tubercle at the vertex, and clothed with numerous black hairs and some brown scales; the face is prominent and black and bears dense brown scales and some black hairs; the antennae are entirely black, the first and second segments furnished with long and short, brown and black, and black hairs respectively; the third is somewhat subulate with a minute apical spine; the proboscis is black, with brownish labella, and rarely extends beyond the epistoma.

The thorax is blackish-brown, provided in front with stiff, dense, grey, hairs; there is a patch of white hairs on the shoulders and some brown, appressed hairs above the wing insertions; the dorsum is covered with brown scales and hairs, with white scales near the collar; the bristles are black; the scutellum is blackish with dorsal brown scales and black marginal bristles; the pleurae are grey dusted with reddish or red-brown hairs; the squamae are blackish or brownish, with a fringe of light brown scales.



The abdomen is black, covered with bands of white, brown, and black scales; the white scales occupy the first segment and the anterior border of the second, the middle of the fourth, the posterior border of the sixth and the larger portion of the apex, while the brown bands are placed on the posterior border of the second, the larger part of the third, the anterior border of the fourth, most of the sixth and a small part of the apex; on each side of the basal segment is a tuft of white hairs; the venter is brownish, covered with shining brown scales.

The legs are brownish, with somewhat darker tarsi, and covered with brown scales; the fore tibiae are provided with hairs only.

The wings are hyaline, light brown at the base and along the fore margin, the colour being generally confined to the costal and subcostal cells, with cell R sometimes faintly tinged.

The female is similar.

Length of body, 4.6 mm.; of wing, 3.5-5 mm.

*Hab.*—Q'land: Brisbane; N. S. Wales: Sydney; Victoria: Melbourne; Tasmania: Hobart, Launceston.

The species described by White as *nigricosta* is probably that described in this revision as *vitrea*, while his *simplex* may be the species I have identified as *nigricosta*.

#### VILLA ALBATA, n. sp.

♂. The head is mainly black; the occiput is black, covered with short, appressed, black hairs and white scales; the ocellar tubercle is black and prominent; the frons is jet black, narrow at the vertex, and bearing erect black hairs and brown scales, the latter more conspicuous on its lower half; the face is bluntly prominent, covered with brown scales and black hairs; the antennae are entirely black; the third segment is about twice as long as the first two together, its basal portion very broad and flattened, and the styliform part very slender, with a minute spine at the apex; the proboscis is short and black; the palpi are also black or very dark brown; the eyes have a rather weak hind indentation, but a long and distinct bisecting line.

The thorax is black, with long, dense, clear white hairs in front and on the sides, and white and brown scales and erect white hairs on the dorsum; the bristles are thin and brown; the scutellum is black, more triangular than semi-circular in shape, covered with white and brown scales and furnished with thin, brown and blackish marginal bristles; the pleurae are provided with long white hairs, which become somewhat golden and much shorter below; the squamae are brownish, with a fringe of white scales; the halteres are light brown, with rather stout stalks.

The abdomen is black, about as long as the thorax, and covered with erect white hairs and white and brown scales; the first, second and third segments are covered laterally with dense, white hairs; the venter is black, covered mainly with brown scales.

The legs are blackish with brown tibiae, and are covered with white scales and hairs; the fore tibiae are provided with hairs only.

The wings are entirely hyaline and glistening; Sc and R<sub>1</sub> are contiguous or almost so; R<sub>2+3</sub> originates from R<sub>4+5</sub> well after r-m; the contact of cell M<sub>1</sub> with the median cell is almost equal to the contact of cell M<sub>5</sub>; both cell R<sub>5</sub> and the cubital cell are broadly open.

Holotype male, Geraldton, W. Australia, 5th September, 1926, E. W. Ferguson. Length of body, 5 mm.; of wing, 5.2 mm. There are two paratypes in the collection of the late Dr. E. W. Ferguson with the same data. The holotype is in the Macleay Museum.

VILLA RAVA, n. sp.

♂. The head is black; the occiput is brownish-black, covered with light brown scales, which are somewhat whitish near the hind indentations of the eyes; the post-vertical furrow is well developed and deep and attains the prominent ocellar tubercle, which is black, and surmounted with a few erect black hairs; the frons is jet black, covered with erect black hairs and brown scales, the latter being more or less confined to its lower half; the face is black, slightly prominent, and covered with dense light brown scales and black hairs; the antennae are entirely black, the first segment being provided with stiff black, and brown hairs; the second is short, and bears short, black hairs; the third is as long as the first two segments together, somewhat subulate, with a rather stout styliform portion, and furnished with a minute spine at the apex; the mouth opening is normal, and the genae are linear; the proboscis is stout and black, with brownish labella, and is concealed within the oral aperture; the palpi are very slender and black; the eyes have a well marked hind indentation and a long and distinct bisecting line, and are separated at the head vertex by slightly more than the width of the ocellar tubercle.

The thorax is brownish-black, finely punctate, with brownish postalar calli, and is covered in front and on the sides with long brownish hairs, and on the dorsum with dark brown scales and long sparse light brownish pubescence; on each side, above the wing insertions there is a patch of very light brown hairs; the bristles are well developed and black; the scutellum is brownish, somewhat black at the base, covered with brown scales and bearing long, black, marginal bristles; the pleurae are provided with whitish and brown hairs; the squamae are brownish, with a fringe of white scales; the halteres are pale brown, with whitish knobs.

The abdomen is black, the two basal segments somewhat brownish laterally, and clothed with white and brown tomentum; there is a thick white pubescent band on the second segment, and bands of white scales on the fourth and sixth segments; the apex is also covered with white scales; the rest of the dorsum is provided with brown scales with some black hairs towards the apex; mingled with these brown scales are a few black scales; on each side of the basal segment is a tuft of soft, clear white hairs, which extend to the posterior border of the second segment; the other segments bear black and brown hairs laterally; the venter is blackish with sparse white pile and a subapical brown band.

The legs are black, covered with bright tawny scales; the fore tibiae are brownish beneath, and are provided with hairs only.

The wings are hyaline, but brown at the base and along the fore margin for two-thirds the length, the colour being dilated so as to cover the bifurcation of veins  $R_{2+3}$  and  $R_{4+5}$ ; the apex of the median basal cell is also tinged brown;  $R_{2+3}$  originates from  $R_{4+5}$  opposite r-m.

The female is similar.

Holotype male, Chinchilla, Q'land, 3rd October, 1926, B. Smith. Length of body, 11 mm.; of wing, 11 mm. Allotype female, Chinchilla, 12th November, 1926, B. Smith. Length of body, 10 mm.; of wing, 11 mm.

There are five paratypes (2 ♂, 3 ♀) in the author's collection and a further eleven (5 ♂, 6 ♀) in the collection of Mr. B. Smith, all taken at Chinchilla, October to November, 1926. There are further specimens taken at the same locality in the collections of Messrs. T. Cole, and A. R. Taylor, of the Prickly Pear Station, Chinchilla.

VILLA QUINQUEGUTTATA, n. sp.

♀. The head is black; the occiput is black, covered with short, appressed black hairs, and brown scales, which appear whitish in certain lights; the ocellar tubercle is placed a little below the vertex of the head, is large and black, and crowned with a few erect black hairs; the frons is black, about three times the width of the ocellar tubercle at the head vertex, and is covered with erect black hairs, and brown scales, the latter being restricted to its basal half; the face is sharply conical, black, bearing brown scales and a few black hairs; the antennae are entirely black; the first segment is cylindrical and is covered with long, stiff, black hairs; the second is short, about one-third the length of the first, and clothed with short black hairs; the third segment is longer than the first and second together, unevenly conical, the inner surface being somewhat concave, and provided with a minute apical spine; the proboscis is black, concealed within the oral aperture; the eyes have a well marked hind indentation and a long and distinct bisecting line.

The thorax is black, with dorsal black and brownish scales, which have purplish reflections, and anterior and lateral stiff, greyish hairs; there are some whitish scales on the shoulders; the pre-alar bristles are black and brown and the post-alar are black; the scutellum is black, covered with black and brown scales and bearing black marginal bristles; the pleurae are provided with stiff, black, and brown hairs; the squamae are black, with a fringe of white scales; the halteres are brown.

The abdomen is blackish, somewhat conical, about as long as the thorax, with a band of white scales on the second segment; the remainder of the dorsum is covered with numerous brown and a few black scales, with some black hairs apically; laterally there is a tuft of white hairs on the first and the anterior half of the second segments; the venter is black, covered with brown scales and scattered black hairs; the brown scales covering the abdomen appear whitish in certain lights.

The legs are mainly brownish, clothed with black and brown scales and black hairs; the fore tibiae are provided with hairs only.

The wings are hyaline, with the base and two-thirds of the fore margin deep brown, leaving the apex of the subcostal cell hyaline; the brown covers the bifurcation of the veins,  $R_{2+3}$  and  $R_{4+5}$ , where it is dilated into a large darkened spot; there are four infuscations in the hyaline area, placed on the veins between the median cell and cell  $M_1$ , the median and cell  $M_2$ ,  $M$  and  $M_4$ , and a larger spot near the origin of  $R_4$ ; cell  $R_5$  is divided by a crossvein.

Holotype female, Sydney, 8th December, 1918, G. H. Hardy. Length of body, 8 mm.; of wing, 8.5 mm.

There are five ♀ paratypes in the collection of Mr. G. H. Hardy, labelled Sydney, 8/12/18, 26/12/18, 24/11/19 (2), and Como 8/10/21 (G. H. Hardy). The holotype is in the Queensland Museum.



*VILLA FUMEA*, n. sp.

♀. The head is black; the occiput is dull black, covered with short black, appressed hairs and yellowish scales, which become silvery white near the hind indentations of the eyes; the post-vertical furrow is well developed and deep; the fringe of hairs at the border of the central cavity is whitish; the ocellar tubercle is dark brown; the frons is dull black, the face is bluntly prominent, and black, both frons and face bearing black hairs, which are more dense and erect on the frons, and dense yellowish scales; around the upper mouth borders are many yellow hairs; the antennae are entirely black; the first segment is about twice the length of the second and is covered with long black hairs; the third segment is slightly broader at the base than the second, quickly attenuated into a long styliform process, and provided with a minute apical spine; the proboscis is black, with large fleshy labella; the palpi are black; the eyes possess a well marked indentation of the hind borders and a long and distinct bisecting line.

The thorax is black, with stiff yellowish hairs in front, and a stripe of almost golden hairs on each side, these hairs being continued around the anterior part of the thorax, just below the collar; the dorsum is covered with black scales and hairs, and there are three indistinct stripes of brown scales, more conspicuous anteriorly; immediately anterior to the scutellum are some fine golden hairs; the bristles are well developed and black; the scutellum is black, covered with black and brown scales, and bearing long black marginal bristles; the pleurae are blackish, with brownish hairs, which become somewhat sparse and pale below the wing insertions; the squamae are dark brown, with a fringe of dark scales; the halteres are brown.

The abdomen is shining black, rather broad, as long as the thorax, with a truncated tip; on the anterior border of the second segment is a very narrow band of white scales, below which is a narrow band of brown scales; there is a broad band of white scales on the fourth segment, which is somewhat dilated laterally; the ultimate and penultimate segments are also covered with white scales; the rest of the dorsum is clothed with black scales and scattered black hairs; on each side of the basal segment are some dense, clear white hairs, which extend to the middle of the second segment; the genital spines are brown; the venter is covered with thin white pile, but the apex is broadly black pollinose.

The legs are black or blackish-brown, with the fore tibiae and hind femora somewhat lighter below; the coxae bear long, white hairs, and the rest of the legs are covered with black scales and hairs; the fore tibiae are devoid of spines.

The wings are brown at the base and along the fore margin, the colour gradually clearing to the apex and hind margin, leaving the wing smoky; there is a clear greyish spot at the apex of the median basal cell; cell  $R_3$  without an interradial vein; cells Cu and  $R_5$  are open.

Holotype female, National Park, Gundamain, 1/3/26, I. M. Mackerras, in the Macleay Museum. Length of body, 15 mm.; of wing, 15.5 mm.

There are three paratype females in the collection of Dr. I. M. Mackerras, all from Gundamain, National Park, dated 14/2/26.

*VILLA ALBOBASALIS*, n. sp.

♂. The head is black; the occiput is dull black, covered with short, appressed, black hairs and brown scales, which become somewhat whitish near the hind indentations of the eyes; the ocellar tubercle is black, prominent, and crowned with a few erect black hairs; the frons is black, faintly shining, covered with

erect black hairs and brown scales, which become rather dense and lighter in colour towards the antennae; the face is slightly prominent, with dense light brown scales and some black and brown hairs; the antennae are entirely black, with stiff black and brown hairs on the first segment; the third segment is subulate, as long as the first and second together, with a thin filiform portion and a minute apical spine; the proboscis is stout and black, and is concealed within the oral aperture; the eyes are separated at the vertex of the head by slightly more than the width of the ocellar tubercle, and possess a well marked indentation of the hind borders and a distinct bisecting line.

The thorax is blackish, covered dorsally with dark brown scales, and furnished in front and on the sides with long, dense, light brown hairs; the bristles are well developed and black; the scutellum is brownish-black, with black and brown scales, the latter more or less confined to the margin, and bearing long, black bristles; the pleurae are blackish, with long whitish-brown hairs; the squamae are brown, with a fringe of white scales; the halteres are brown with lighter knobs.

The abdomen is black, not as long as the head and thorax, with brownish lateral areas on segments two and three; there is a thick band of white scales and hairs on the first segment and the basal third of the second, a band of silvery scales on the fourth, which is very narrow medianly, and similar scales on the sixth and apical segments; there are narrow brown scaly bands on the second, medianly, the third, basally, and the fourth and fifth, apically; the rest of the dorsum is covered with black scales and scattered black hairs; the hair on the sides of the basal segments is dense and white, and extends to the posterior border of the basal white band, the sides of the other segments bearing sparse black hairs; the venter is covered with thin white pile, with an apical black band.

The legs are mainly black, covered with brown scales and black hairs; the fore tibiae are provided with hairs only.

The wings are hyaline and glistening, brownish at the base and for a short distance along the fore margin, the colour following the course of the closely adjacent veins Sc and R<sub>1</sub>, leaving the apical half of the costal cell more or less clear; r-m is placed a little before the median cell; cell R<sub>5</sub> is very long and narrow, hardly broader at the apex than at the base; there is a patch of white scales on the wing shoulders.

Holotype male, Chinchilla, Q'land, November, 1926, A. P. Dodd. Length of body, 10 mm.; of wing, 10.5 mm.

There are five paratype males, collected by Mr. A. P. Dodd at Chinchilla during November, 1926, and a further paratype male in the collection of Mr. G. H. Hardy (Brisbane, 27/12/1920).

The holotype is in the Queensland Museum.

#### VILLA SIMPLEX Macquart.

*Anthrax simplex*, Macquart, *Dipt. Exot.*, suppl. 2, 1847, 52; White, *Proc. Roy. Soc. Tasm.*, 1916, 212; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 50.

♂. The head is black; the occiput is blackish, covered with brownish scales, which become whitish near the hind eye indentations; the frons is black, covered with erect black hairs and brown scales, the latter more or less confined to its lower half; the face is black, prominent, bearing white scales and a few black hairs; the antennae are entirely black, the third segment somewhat conical and provided with a minute apical spine; the proboscis is black and is concealed

within the oral aperture; the eyes are separated at the vertex by slightly more than the width of the ocellar tubercle and have a well marked indentation of the hind borders and a long and distinct bisecting line.

The thorax is blackish, covered dorsally with dark brown scales and a few black hairs, and bearing in front and on the sides, white or greyish hairs; the bristles are black, though rather weak; the scutellum is black, covered with dark brown scales and furnished with weak, black marginal bristles; the pleurae are blackish, with stiff, whitish or brownish hairs; the squamae are light brown with a fringe of white scales; the halteres are brown.

The abdomen is black, with bands of white scales on the second and fourth segments, and narrow bands of brown scales on the second, fourth, fifth and sixth segments; the apex is covered with white scales; the remainder of the dorsum is clothed with black scales and scattered black hairs; the venter is black, covered with brown scales and black hairs; on each side of the basal segment are some dense, whitish or yellowish hairs.

The legs are black or dark brown, the femora being somewhat brownish beneath; they are covered with brown scales and black hairs; the fore tibiae are provided with hairs only.

The wings are hyaline but brown at the base and along the fore margin, leaving the apical third of the costal cell almost clear, the colour being bounded below by the vein  $R_1$ .

Length of body, 4-7 mm.; of wing, 3.5-6 mm.

The female is similar.

*Hab.*—Q'land: Brisbane, Dunwich; N. S. Wales: Sydney; Tasmania: Hobart.

This species is apparently very variable in the colour of the hairs of the pleurae and at the sides of the first segment of the abdomen. In some specimens the hairs on the pleurae are clear white and in others, almost reddish, while the hairs at the base of the abdomen are white or yellow. The species may easily be distinguished from others of a similar size by the white scales on the face.

#### VILLA ARGENTIPENNIS White.

*Anthrax argentipennis*, White, *Proc. Roy. Soc. Tasm.*, 1916, 212; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 48.

♂. The head is mainly black; the occiput is grey dusted, covered with short, appressed, black hairs and brown scales, which are whitish near the hind indentations of the eyes; the frons is black, covered with erect black hairs and brown scales; the face is black, bluntly prominent, and is also covered with brown scales, with some brown hairs along the upper mouth borders; the antennae are entirely black, the third segment unevenly conical, being concave inwardly, and with a minute apical spine; the proboscis is black, and is concealed within the oral aperture; the eyes are separated at the vertex of the head by slightly more than the width of the ocellar tubercle, and have a well marked hind indentation and a distinct bisecting line.

The thorax is brownish-black, with anterior and lateral light brown or dirty white hairs, those on the sides being somewhat lighter in colour; the bristles are well developed and black; the scutellum is brownish-black, covered with brown scales and bearing long black, marginal bristles; the pleurae are furnished with brown or reddish hairs; the squamae are brownish with a fringe of white scales.

The abdomen is brownish-black, with dense, long, white hairs on the sides of the first and second segments; there are bands of white scales on the second, fourth



and sixth segments, and bands of brown scales on the second, third, fourth and fifth segments; the apex is provided with white scales.

The legs are mainly brownish, covered with brown scales and black or brownish hairs; the fore tibiae are devoid of spines.

The wings are hyaline and glistening, and are deep brown at the base and along the fore margin, the brown being expanded from the base to colour most of cell R; cells Cu and R<sub>5</sub> are broadly open.

The female is similar.

Length of body, 6 mm.; of wing, 5.8 mm.

*Hab.*—Tasmania: Bagdad, Wedge Bay.

I have only seen two specimens of *argentipennis*, and they are both in the collection of Mr. G. H. Hardy, a male and a female.

#### Genus LEPIDANTHRAX Osten-Sacken.

*Lepidanthrax*, Osten-Sacken, *Biol. Cent. Amer., Dipt.*, 1886, 107.

Genotype, *Anthrax disjuncta* Wied. by Coquillett's designation, 1910.

The head is large and globular; the frons is broad in both sexes; the face is large between the upper mouth borders and the base of the antennae; the antennae are widely separated at the base, and are inserted near the inner borders of the eyes; the third segment is onion-shaped, with a long filiform style, and a minute apical spine; the proboscis is considerably longer than the oral opening, and generally projects forward.

The thorax is quadrate, broadest behind, and furnished with well developed pre- and post-alar bristles; the scutellum is semicircular in shape, appressed, and provided with marginal bristles.

The abdomen is similar to that found in *Villa*, though its sides are fringed mainly with scales.

The legs are slender, the fore tibiae sometimes being provided with minute spines; pulvilli are absent; the claws are without a basal tooth.

The wings have the typical venation of the Exoprosopinae, but the contact of cell M<sub>4</sub> with the median cell is sometimes much longer than found in *Villa*; cells Cu and R<sub>5</sub> are always open.

*Range.*—Europe, Southern Asia, North and South America, North and South Africa, and Australia.

There are two species which fall into this genus, *linguata*, from Queensland and New South Wales and *albifrons* from South Australia, both being new. There is a third species, as yet undescribed, in the collection of the Macleay Museum. All these species agree in the main characters with Osten-Sacken's description of the genus, except that in none of them are the fore tibiae provided with spines, and the contact of cell M<sub>4</sub> with the median cell is not especially long, though it is sometimes longer than usually found in *Villa*.

These species were recorded by Hardy in the genus *Cytharea*, but as I mentioned before, this genus bears a much closer affinity to the Bombyliinae than to the Exoprosopinae.

#### Key to the Species of *Lepidanthrax*.

1. Face conical, covered with brown scales ..... *linguata*, n. sp.  
     Face not so conical, covered with white scales ..... *albifrons*, n. sp.

#### LEPIDANTHRAX LINGUATA, n. sp.

♂. The head is black; the occiput is black, covered with brown scales, which appear whitish in certain lights; the post-vertical furrow is deep, but not very

long; the ocellar tubercle is prominent, blackish, and crowned with a few erect black hairs; the frons is black, about twice the width of the ocellar tubercle at the vertex, and covered with erect black hairs, and brown scales, which are more conspicuous on its basal half; the face is prominent, black, and covered with brown scales and some black hairs; the antennae are entirely black, the first segment broadest at the apex and provided with long stiff black hairs; the second is short, globular, and bears short black hairs; the third is about one and one-half times as long as the first two together, the discoidal portion being longer than the second segment, and of an equal width; the mouth opening is rather broad; the proboscis is slender, black, and projecting forward, being about twice the length of the oral opening; the palpi are blackish.

The thorax is of a faintly shining black, covered dorsally with brown and black scales, and in front and on the sides with long, dense, brownish or yellowish hairs; the bristles are black; the scutellum is black, with brownish scales and black marginal bristles; the pleurae are blackish, with brown and black hairs; the squamae are brown, with a fringe of dirty white or light brown scales; the halteres are an obscure light brown, with lighter knobs.

The abdomen is black, about as long as the head and thorax; there is a basal band of white scales, the rest of the dorsum being covered with brown scales with a few erect black hairs apically; on each side of the basal segment are some dense, dirty white, hairs, which extend to the middle of the second segment; the venter is black, covered with brown scales; the genitalia are brownish.

The legs are mainly blackish, the fore tibiae being brownish at their base, and are covered with brown scales and black hairs; the fore tibiae are provided with hairs only.

The wings are hyaline and glistening, faintly brown at the base and between the veins Sc and  $R_1$ ; the terminal loop of the vein  $R_{2+3}$  is well developed; cell  $R_5$  is long and narrow, about twice as wide at the wing margin as at the base;  $r-m$  is placed at about the middle of the median cell, with the origin of  $R_{2+3}$  just anterior to it;  $R_{2+3}$  is provided with a small appendix near its origin.

The female is similar.

Holotype male, Brisbane, Q'land, 21/11/26, F. Roberts. Length of body, 4 mm.; of wing, 3.5 mm. Allotype female, Brisbane, Q'land, 22/11/26, F. Roberts. Length of body, 3.5 mm.; of wing, 3 mm.

There are sixteen paratypes (10 ♂, 6 ♀) in the author's collection, all taken at Brisbane between 12th November and 2nd December, 1926. There is a further paratype female in the possession of Dr. I. M. Mackerras (National Park, 1/3/26). In the collection of the late Dr. Ferguson there are two further specimens from Cassilis, N.S.W. The holotype and allotype are in the Queensland Museum.

#### LEPIDANTHRAX ALBIFRONS, n. sp.

♀. The head is mainly blackish; the occiput is grey dusted, and is completely covered with dense white scales; the frons is blackish, clothed with dense white and brown scales, the latter confined to the upper half; the face is black, not conical, but more or less bluntly prominent, and covered with dense white scales, which are stained somewhat yellowish between the upper mouth borders and the antennae; the antennae are blackish; the first and second segments are provided with long and short black hairs respectively; the third is about twice as long as the first two together, with an extremely slender styliform portion; the ocellar tubercle is brownish, rounded, and prominent; the proboscis is black and slender,

not quite twice the length of the oral aperture; the eyes are separated at the vertex by about three times the width of the ocellar tubercle, and possess a well developed hind indentation and a distinct bisecting line.

The thorax is blackish-brown, covered dorsally with brown and black scales; in front there are some long, stiff, brownish hairs, behind which are some stiff, white hairs; on each side and above the wing insertions is a stripe of appressed, white hairs, which extend from the post-alar calli to the stiff white hairs in front; immediately anterior to the scutellum is a small patch of white hairs, which, when intact, may meet the white stripe of the sides; the bristles are black, those on the post-alar calli being rather long; the scutellum is blackish-brown, covered with brown scales and bearing black marginal bristles; the pleurae are covered with white scales below, and sparse white hairs above; the halteres are dark.

The abdomen is somewhat broad, widest medianly, and covered with white, brown and black scales; on the anterior third of the second segment is a band of white scales, and there are similar scales on the sides of the other segments and on the apex; the dorsum is otherwise covered with brown and a few black scales and hairs; on the sides of the basal segment the hairs are yellowish and on the second segment, white; the venter is covered with some dirty white scales, with some clearer white pile basally.

The legs are mainly brownish, with darker tibiae and tarsi; the femora appear to be covered with brown scales above and white below; the tibiae are covered with brown scales only; the fore tibiae are devoid of spines.

The wings are dull hyaline, tinged brown at the base and between the veins Sc and R<sub>1</sub>; the fore margin is somewhat greyish; r-m is placed before the middle of the median cell, with the origin of the vein R<sub>2+3</sub> just anterior to it; cell R<sub>5</sub> and the cubital cell are broadly open.

Holotype female, Pearson's Island, Sth. Australia, Campbell. Length of body, 7 mm.; of wing, 6.5 mm. Allotype male, Pearson's Island, Sth. Australia, Campbell. Length of body, 6.5 mm.; of wing, 6 mm.

In the male the proboscis is longer than that of the female, being easily twice the length of the oral aperture.

No paratypes are known.

Both the holotype and allotype are not in the best condition, the abdomen in the male being almost entirely rubbed, while that of the female, though in much better condition, makes it very doubtful as to the extent of the white scales on the third, fourth, fifth and sixth segments.

The holotype and allotype are in the South Australian Museum.

Genus PSEUDOPENTHES, n. gen.

Genotype, *Pseudopenthes fenestrata*, n. sp.

The head is large and globular; the ocellar tubercle is rounded, not very prominent, placed well below the head vertex; the frons is comparatively broad in both sexes; the face is conical, or sharply prominent and, like the frons, is covered with dense hairs and scales; the antennae are moderately stout; the first segment is cylindrical, the second short and globular, and the third somewhat conical and rather stout, longer than the first and second together, with a minute apical spine; the proboscis is hardly longer than the oral opening, though its tip is sometimes visible; the palpi are slender.

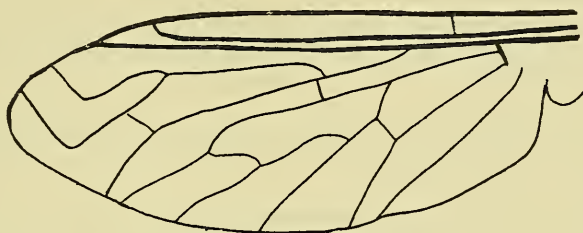
The thorax is quadrate, with rather weak pre- and post-alar bristles; the scutellum is large, depressed, with weak marginal bristles; the squamae are large, with a fringe of scales.



The abdomen is not very broad, somewhat parallel sided, covered mainly with scales.

The legs are slender, the fore tibiae being sometimes provided with distinct spicules; the claws of the intermediate and posterior tarsi are furnished with a long and acute basal tooth.

The wings are strong, with well developed lobes and alulae; cell  $R_3$  is divided by a crossvein; cell 2nd  $M_2$  is very long and rather narrow; cell  $R_5$  and the cubital cell are open; the vein  $Cu_2$  is incomplete.



Text-fig. 4. Wing of *Pseudopenthes fenestrata*, n. sp.

*Pseudopenthes* apparently links together the genera *Villa* and *Exoprosopa*. As in *Exoprosopa*, the frons is comparatively broad in both sexes, the ocellar tubercle is placed well below the vertex of the head, the third antennal segment is stoutly conical, cell  $R_3$  is divided, and the claws have a long and acute basal tooth. It differs from *Exoprosopa* and approaches *Villa* in the character of the style, which is represented by a minute bristle. It is also related to the African genus *Littorhyncus*, and the American genus *Stonys*. From the former it may be distinguished by the convexity of the face and the possession of an interrarial vein in cell  $R_3$  and from the latter by the basal tooth of the claw.

#### PSEUDOPENTHES FENESTRATA, n. sp.

♂. The head is black; the occiput is shining black, covered with numerous appressed black hairs and dense white scales, which are more or less concentrated near the hind indentations of the eyes; the ocellar tubercle is black, rather large, and crowned with a few erect black hairs; the frons is shining black, covered with erect, black hairs, and numerous white scales, more conspicuous on its lower half; the face is black between the upper mouth borders and the antennae, otherwise brownish, and clothed with white scales and black hairs; the first segment of the antennae is somewhat brownish, bearing long, stiff, black hairs; the second segment is black, about one-third as long as the first, bearing short black hairs; the third is black, slightly longer than the first and second segments together. The mouth opening is rather broad; the proboscis is black, with the tip protruding beyond the epistoma.

The thorax is shining black, finely punctate, and covered on the dorsum with shining jet black scales; the hairs in front and on the sides are white, the latter appearing as a distinct stripe, when contrasted with the scales of the dorsum and the black hairs of the pleurae; the bristles are black; the scutellum is somewhat brownish, covered with black scales; on the margin are some white scales and black bristles; the squamae are black, with a fringe of white scales; the halteres are brownish with lighter knobs.

The abdomen is black, as long as the head and thorax together, and is covered mainly with black scales; on the anterior border of the second segment is a very narrow band of white scales, somewhat yellowish medianly, and on the sides of the third, fourth and fifth segments are small areas of similar scales, those on the third segment being rather larger; the apex is also covered with white scales; on each side of the first segment are some soft, dense, white hairs; the venter is brownish, covered with black and white scales, the latter not very numerous and more conspicuous towards the apex.

The legs are black-brown, covered with black scales and hairs; the fore tibiae are provided with hairs only.

The wings are mainly dark brown, almost black, with portions of the median basal and cubital cells and the lobe hyaline; the colour is deepest around the veins, leaving a small clearer area in the interior of each cell.

The female is similar.

Holotype male, Brisbane, 27th October, F. Roberts. Length of body, 10.5 mm.; of wing, 11 mm. Allotype female, Goodna, Q'land, 20/11/25, J. Mann. Length of body, 12 mm.; of wing, 11.5 mm.

There are six paratypes in the author's collection, 4 ♂, 2 ♀, from Brisbane, and Stradbroke Is., Q'land, and Gravesend, N.S.W. There are also three paratypes in the collection of Mr. J. Mann from Brisbane. This species is well represented in various collections, and has been taken at Woy Woy, Camden, and the Darling River, N. S. Wales; there are specimens in the collection of the Macleay Museum labelled South Australia.

In three of the paratypes there are distinct, though minute bristles on the fore tibiae, and the wings are uniformly blackish.

The holotype and allotype are in the Queensland Museum.

Among the material examined I have not been able to recognize *Anthrax flaveola* Macquart, *Anthrax resurgens* Walker and *Exoprosopa bicellata* Macquart. In case these three species should be discovered, I am appending the original descriptions.

#### VILLA FLAVEOLA Macquart.

*Anthrax flaveola*, Macquart, *Dipt. Exot.*, suppl. 4, 1850, 109; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 51.

"Nigra, flavo-hirta. Abdomine segmentis, 4.°-5.° que lateribus nigra pilosis. Alis hyalinis.

"Long. 6 l. ♂. Voisin de l'*A. flava*. Face à poils jaunes. Front à duvet d'un jaune plus fonce et petits poils noirs. Antennes noires. Thorax (un peu dénudé), à poils jaunes laissant voir des bandes longitudinales. Abdomen à fourrure jaune (dénudé au bord postérieur des segments); une touffe de poils noirs sur les côtés des quatrième et cinquième; quelques poils noirs mêlés aux jaunes, au bord postérieur des mêmes; septième terminé par des poils noirs; ventre à poils d'un jaune plus clair. Pieds noirs. Cuisses à duvet jaune. Ailes hyalines; côté jaunâtre; nervures normales. De la Nouvelle-Hollande, côte orientale".

There is a specimen in the collection of Dr. I. M. Mackerras, taken at Lake Barrine, North Queensland, which conforms somewhat to this description. The abdomen is rather rubbed, and its identification is very doubtful. However, it is the only specimen of *Villa* that I have seen approaching Macquart's description.

## VILLA RESURGENS Walker.

*Anthrax resurgens*, Walker, *List Dipt. Brit. Mus.*, 1849, 259; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 49.

"Nigra, abdomine maculis quatuor ferrugineis, subtus fulvo, pedibus fulvis, genubis tarsisque piceis, alis limpidis, ad costum flavo-fuscis".

Body black; head wanting; sides and fore border of chest clothed with pale tawny hairs, which are more thick on the hoary breast; abdomen clothed with yellow hairs, tawny beneath, and having two large ferruginous spots on each side of the second and third segments; legs tawny, clothed with yellow hairs and black bristles; knees and feet piceous; wings colourless, yellowish-brown at the base and along the fore border till near the tips; wing ribs and veins piceous, the latter black towards their tips; poisers tawny with yellow tips. Length of the body about 6 lines; of the wings 14 lines.

"Swan River".

It is possible that *resurgens* is a synonym of *obscura*, but I am not at all certain on this point.

## VILLA BICELLATA Macquart.

*Exoprosopa bicellata*, Macquart, *Dipt., Exot.*, suppl. 2, 1847, 51; White, *Proc. Roy. Soc. Tasm.*, 1916, 206; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 51.

"Nigra, rufo tomentosus. Alis fuscis hyalino maculatis, duabus cellulis marginalibus. Tab. 2, fig. 2.

"Long, 5½ l. ♂. Face conique, d'un fauve rouge, ainsi que la moitié antérieure du front; la postérieure d'un brun noirâtre. Antennes noires; premier article épais, à duvet fauve. Ecusson (dénudé) brunâtre, à base noire. Abdomen (en partie dénudé); côtés des deux premiers segments à poils fauves; ceux des autres à poils noirs, mêlés de fauves; deuxième à petite tache fauve de chaque côté. Pieds d'un fauve assez clair; jambes antérieures à extrémité noire; tarses noirs. Balanciers bruns. Ailes d'un brun noirâtre; deux cellules sous-marginales; discoïdale appendiculée; une grande tache d'un fauve brunâtre vers le milieu du bord extérieur; deux petites taches noires à la base des premières sous-marginale et postérieure; une petite tache blanchâtre à la base de la discoïdale; une bande ou une petite tache hyaline au centre des marginales, des postérieures et de la discoïdale.

"De la Tasmanie".

## Subfamily ANTHRACINAE.

The occiput is raised, bilobate above and with a central cavity; the hind borders of the eyes are indented and the bisecting line is usually long and distinct. The third segment of the antennae bears a distinct style which terminates in a pencil of hairs. The venation is the same as that encountered in the *Exoprosopinae*. Pulvilli are always present, though usually rather weak.

The subfamily contains a solitary genus *Anthrax*. *Spongostylum*, which occurs in Africa and America, is also placed here, but as far as an examination of two species received from South Africa will permit, I can determine no outstanding characters for the distinction of the two genera. The third segment of the antennae is broader than the second in *Anthrax* and not quite so in *Spongostylum*. In *maculata* and *incompta* the third antennal segment conforms to the type found in *Anthrax*, while in *angularis* and *confluens* it is of the type found in *Spongostylum*. *Spongostylum*, according to Williston and Brunetti, is



also supposed to have an interrarial vein in cell  $R_3$  always present. In *maculata* this crossvein is sometimes present, but generally absent. The character of the comparative widths of the second and third antennal segments is certainly not to be reckoned generic and therefore it seems that *Spongostylum* and *Anthrax* should be considered synonymic.

#### Genus ANTHRAX Scopoli.

*Anthrax*, Scopoli, *Ent. Carl.*, 1763, 358.—*Argyramoeba*, Schiner, *Wein. Entom. Monatschr.*, iv, 1860, 51; White, *Proc. Roy. Soc. Tasm.*, 1916, 213; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 50, and 1923, 76.

Genotype, *Musca anthrax* Schrank, by original designation.

The head is globular in shape and generally a little broader than the thorax; the eyes are wide apart in both male and female; the ocelli are placed on a rounded prominence at or close to the head vertex; the frons is slightly raised between the eyes; the face is never prominent, both face and frons being clothed with dense hairs; the antennae are small, the third segment more or less onion-shaped, sometimes with a produced margin to be broader than the globular second segment; the style is distinct and typical of the subfamily; the mouth opening is short and very broad and contains the short stout proboscis.

The thorax is somewhat quadrate, more or less flattened, and is provided with dense hairs in front and on the sides; the metapleurae are bare; the squamae are well developed and provided with a fringe of hairs; the halteres are slender; the scutellum is rather large, depressed and somewhat semicircular in shape; the bristles on the thorax and scutellum are rather weak.

The abdomen is rather short and stout, flattened below, but rounded above, broadening posteriorly and with a pointed apex; the whole is covered with dense pubescence which is longest on the sides; the genital spines of the Exoprosopinae are replaced by long hairs.

The legs are of medium length, slender and with weak spines on all the tibiae; the fore femora are usually provided with long hairs only; pulvilli are present, though not strongly developed.

The wings are stout and strong, usually with a broad black pattern and sometimes with infuscated spots at the crossveins and bifurcations; the venation is that found in the Exoprosopinae;  $R_1$  is usually provided with one or two appendices which may be continued to divide cells  $R_3$  and  $R_4$ ; cell  $R_5$  is always broadly open and the cubital may sometimes be closed at the wing border.

*Range*.—World-wide.

As far as is known the genus in Australia comprises eight species, three of which are regarded as new. They are small to medium-sized Bombylids, usually with silver-white scales on the apex of the abdomen and with wings that generally have a broad black pattern, sometimes provided with numerous infuscated spots on the disc. In the bush they are usually to be found flitting about logs and stumps charred by fire. As the genus is apparently parasitic on Hymenoptera, the charred logs are attractive as they are used by various bees and wasps for their nests. Some species, particularly *angularis*, *confluens* and *maculata*, may be seen flying about houses and other structures frequented by mud-building wasps. From the mud cells of the Eumenid, *Abispa splendida*, and of the Sphegid, *Sceliphron laetum*, *angularis* has been successfully bred; *incisa* and *incompta* from the cells of another Eumenid genus, *Odynerus*; and *maculata* from the nest of the native bee, *Trigona carbonaria*. An interesting life history has

lately been found for *confluens*. The species has frequently been seen attempting to oviposit on the mud cells of several house-haunting wasps, though several attempts to obtain the fly from these cells were not successful. Mr. L. Franzen of Brisbane, some short time ago, brought before the Entomological Society of Queensland a specimen of this species which he had obtained from the cocoon of a Myrmeleontid—a very interesting and puzzling life history which is not at all easy to explain, as the species, like the other members of the genus, is very probably parasitic on Hymenoptera as well.

The genital spines possessed by the Exoprosopinae are replaced in *Anthrax* by dense long hairs. The egg is apparently laid on the outside of the nest or cell and the larva is provided with a boring apparatus, by means of which it is able to reach the host within.

*Distribution*.—Only one species, *maculata*, is known to occur in Tasmania. It extends as far north as Cape York, but is as yet unrecorded from Western Australia. The Western Australian species are limited to two, *incompta* and *angularis*, both of which extend into northern Queensland, *incompta* being extra-limital, as it is known from the Bismarck Archipelago; *incisa* occurs from Adelaide to Central Queensland, and *concesa* and *confluens* appear limited to Queensland and New South Wales. Both *lepidiota* and *ater* are known from Queensland only, the former from the south-western corner and the latter from the north.

*Key to the Species of Anthrax.*

1. Wings hyaline, but brown at the base and along the fore margin only ..... 2  
   Wings with a broad black pattern, the hyaline area being sometimes much reduced  
     by spots and blotches ..... 3
2. Wings spotted; a small species ..... *lepidiota*, n. sp.  
   Wings not spotted; a large species ..... *angularis* Thomson.
3. Wings with the black pattern including the apex ..... *ater*, n. sp.  
   Wings with the apex not uniformly black ..... 4
4. Wings spotted or blotched ..... 5  
   Wings not spotted or blotched ..... 7
5. Cell  $R_2$  divided by a crossvein;  $R_4$  with two complete branches; the apical half of the  
   wing contains many confluent blotches and small smoky areas .. *confluens*, n. sp.  
   Cell  $R_3$  sometimes with a crossvein;  $R_4$  at most with an appendix; the apical half  
   of the wing contains many clearly defined spots, which may be confluent, but  
   never blotchy ..... 6
6. The black pattern of the wing more or less confined to the basal half; hind border of  
   wing without spots ..... *incompta* Walker.  
   The black pattern occupying more than half the wing; hind border of wing with  
   numerous spots ..... *maculata* Macquart.
7. Wings with axillary lobe mainly clear ..... *angularis* Thomson.  
   Wings with axillary lobe black ..... 8
8. The outline of the black area of the wing is angulated near the costal border .....  
   ..... *concesa* Macquart.  
   The outline of the black area of the wing is not angulated but is somewhat  
   irregular ..... *incisa* Macquart.

ANTHRAX MACULATA Macquart.

*Anthrax maculata* Macquart, *Dipt. Exot.*, suppl., 1, 1846, 112.—*Anthrax diana*, Walker, *List Dipt. Brit. Mus.*, 1849, 252.—*Anthrax australis* Walker, *Ins. Saund. Dipt.*, 1850, 193.—*Argyramoeba maculata* White, *Proc. Roy. Soc. Tasm.*, 1916, 213; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 50, and 1923, 76.

♂. The head is black; the occiput is somewhat grey dusted, and bears numerous short, depressed, black hairs and some white scales; the face and frons are black, both covered with dense black hairs; the antennae are entirely

black, the third segment broader than the second and somewhat onion-shaped, the proboscis is black; the eyes have a well developed indentation at their hind borders and a long and distinct bisecting line.

The thorax is blackish and is furnished with stiff greyish and black hairs in front and on the sides; the dorsum is covered with upright black and appressed cuprous or brownish tomentum; the bristles are black; the scutellum is blackish-brown, covered with black and brownish scales and provided with long, thin, marginal bristles; the squamae are dark with a white fringe.

The abdomen is black, with the apex covered with silver white scales; on each side of the posterior border of the second segment there is a narrow strip of white tomentum; the rest of the dorsum is covered with black scales and hairs; on each side of the basal segment is a tuft of soft white pile and the sides of the remaining segments (except the apical ones) are provided with dense, long, black hairs.

The legs are black or black-brown and are covered with black scales and hairs.

The wings have a broad, black, irregular pattern, whose inner margin is almost dilated into two distinct spots near the hind border of the wing, and into a large, very irregular, indented area, reaching almost across the wing; along the hind margin of the wing are four isolated or partly isolated spots; the cubital cell may be closed at the wing margin.

The female is similar.

Length of the body 7.5-10 mm.; of the wing 8-10.5 mm.

*Hab.*—Queensland: Cape York, Marwood, Meringa, Pt. Denison, Pt. Curtis, Yeppoon, Brisbane, Stradbroke Is.; N.S. Wales: Sydney, Piper's Flats, Hay, Barrington Tops, Mt. Kosciusko; Tasmania: Cygnet, Georgetown, also from South Australia.

The vein  $R_4$  has a rather deep dip into cell  $R_3$  and from this dip there is usually a short downwardly projecting appendix. This appendix never becomes a complete interradiial vein so cell  $R_4$  is never divided. There is another stump present near the bifurcation of  $R_{4+5}$ , but this appendix is occasionally continued to meet  $R_{2+3}$ , so that cell  $R_3$  becomes divided.

The spots on the wing are sometimes completely isolated, but in various specimens they have become wholly or partly confluent. In a male from Meringa this confluency has been carried to such an extent that the wings are wholly brown except for the apex and small areas between the spots on the hind margin.

#### ANTHRAX LEPIDIOTA, n. sp.

♂. The head is grey-black; the occiput is grey-black, covered with bronze scales and with light brown hairs bordering the central cavity; the post-vertical furrow is well developed and deep; the ocellar tubercle is rounded, somewhat sunken, but prominent; the antennae are entirely black; the first segment, at its apex, is about twice as wide as at the base, the second is extremely short and the third is longer than the first two segments together; at the base, the third segment is slightly broader than the second and bears a style of about one-quarter its length; the frons is slightly concave above, but near the antennae becomes raised, blackish-brown, but grey along the inner eye margins, and covered with erect black hairs and brown scales; the face is blackish, becoming grey towards the cheeks, and also has black hairs and brown scales.



The thorax is black and bears distinct bronze scales on the dorsum and is provided in front and on the sides with whitish hairs, those placed laterally forming a not well defined stripe; the bristles are black; the scutellum is black covered with brownish scales and bearing long, black, marginal bristles; the pleurae are black with a few golden hairs; the squamae are dark with a white fringe; the halteres are brownish with lighter knobs.

The abdomen is blackish, not as long as the head and thorax, with dorsal brownish or bronze scales and a few black hairs; on each side of the second and on the apical segments are some white scales; on each side of the basal segment is a tuft of white hairs; the venter is dark with shining scales.

The legs are brownish with somewhat darker tarsi and are covered with shining brown scales and brown and black hairs; the pulvilli are brownish.

The wings are dull hyaline, brown at the base and along the fore margin, the brown descending to cover the apex of the median basal cell and again, but more anteriorly, the bifurcation of  $R_5$ ; there are two small brown spots on the veins between the median and cell  $M_3$  and the median and cell  $M_1$ , and a larger spot at the origin of  $R_1$ ; both  $R_4$  and  $R_{2+3}$  have long appendices and  $R_{2+3}$  has a well developed terminal loop.

Holotype female, Chinchilla, Queensland. November, 1924. T. A. Cole. Length of the body, 8.5 mm.; of the wing, 9 mm.

The holotype is unique and is in the Queensland Museum.

#### ANTHRAX CONFLUENSIS, n. sp.

♂. The head is black; the occiput is grey dusted and somewhat whitish near the indentations of the hind eye borders and covered with short black hairs; the post-vertical furrow is deep and attains the ocellar tubercle, which is rounded, prominent and black; the frons and face are black, covered with dense short black hairs; the antennae are entirely black, the first segment rather stout and covered with stiff black hairs, the second short, and the third longer than the first and second together, but with the basal discoidal part not as broad as the second segment; the style measures about one-fourth the length of the third segment; the proboscis is black; the palpi are black; the eyes have a well developed hind indentation and a long and distinct bisecting line.

The thorax is blackish, covered dorsally with black and brownish scales and erect black hairs; the hairs in front are mainly grey and those on the sides black; the bristles are black, not very strong; the scutellum is blackish covered with black scales and provided with black marginal bristles; the pleurae bear stiff blackish hairs; the squamae are blackish with a fringe of white hairs; the halteres are black with lighter knobs.

The abdomen does not broaden posteriorly as much as in the other species, the sides being gently curved; the apex is pointed and is covered with silver-white scales; except for a narrow interrupted white band on the posterior border of the second segment, the dorsal pubescence is uniformly black; on each side of the basal segment there is a tuft of white hairs and on the remaining segments black hairs; the venter is black, covered with black scales and hairs.

The legs are black, covered with black scales and hairs; the pulvilli are dark.

The wings have a broad black or dark brown pattern, the apical half consisting of confluent blotches and clearer smoky areas; cell  $R_3$  is divided by a crossvein;  $R_4$  is branched, so that a triangular extra cell is formed; r-m is placed

before the middle of mc and  $R_{2+3}$  originates well before r-m and its loop is angular;  $M_{3+4}$  has a short appendix; the cubital cell is narrowly open.

The female differs from the male in the greater width of the frons at the head vertex and in the absence of silver scales on the apex of the abdomen.

Holotype male, Brisbane, January 23rd, 1926. F. H. Roberts. Length of the body, 5 mm.; of the wing, 5.5 mm. Allotype female, Brisbane, May 1st, 1926. J. Mann. Length of the body, 5.3 mm.; of the wings, 5.5 mm.

There are six paratypes in the author's collection (5 ♂, 1 ♀), all from Brisbane and collected about January, 1926. There are further specimens in the collections of J. Mann (Brisbane, Killara), the late Dr. E. W. Ferguson (Glenreagh, Dorriggo), Dr. I. M. Mackerras (Meringa, Gayndah).

In several collections, *confluens* has been confused with *maculata*. There are three distinct characters for the separation of the two species; in *maculata* (1) the female, as well as the male, possesses a silvery-white apex on the abdomen, (2)  $R_4$  is sometimes provided with an appendix, but never completely branched, (3) the discoidal portion of the third antennal segment is much broader than the second.

The holotype and allotype are in the Queensland Museum.

#### ANTHRAX ATER, n. sp.

♂. The head is black; the occiput is black, somewhat shining, and covered with short, appressed, black hairs; the frons is black, slightly broader than the width of the ocellar tubercle at the vertex, and clothed with dense, erect, black hairs; the face is grey dusted, also covered with dense, black hairs; the cheeks are also grey dusted; the antennae are black, the third segment with a somewhat produced margin, so that it is slightly broader than the second; the style is not very distinctly marked; the proboscis is black; the eyes have a well developed hind indentation and a fairly distinct bisecting line.

The thorax is black, with anterior stiff brownish and black hairs; the dorsum is covered with black scales, and some golden or cuprous, appressed hairs, which are more conspicuous in front and above the wing insertions; the bristles are rather weak, black; the scutellum is black, covered with black scales, and thin appressed, golden hairs, and bears thin, weak, marginal bristles; the pleurae are grey dusted, with soft whitish or yellowish hairs; the squamae are black, with a very short fringe of whitish scales; the halteres are black.

The abdomen is black, covered almost entirely with black scales and hairs; on each side of the posterior border of the first segment there is a small line of white scales; the hairs on each side of this segment are yellowish, the remaining segments being covered laterally with sparse black hairs; the venter is black, covered mainly with black scales, but a few brown scales can be seen.

The legs are mainly black, clothed with black scales and hairs; the bristles are rather weak.

The wings are black, with a somewhat large, indented hyaline area below and towards the apex; the outline of this hyaline area is very irregular, and is almost divided by a broad black area, which projects down into it from the pattern of the wing and almost reaches the hind margin; there is a hyaline spot near the apex of cell  $R_5$ , and a second larger spot extending between mc and cell  $M_3$ ; the veins are brownish and stand out from the rest of the wing; the cubital cell is closed a little before the wing margin;  $R_{2+3}$  has a rather small terminal loop.

Holotype male, Meringa, Q'land, November, 1926, Goldfinch. Length of body, 5 mm.; of wing, 4.5 mm.

There is a single paratype male, with the same locality and date, in the collection of Dr. I. M. Mackerras.

Both holotype and paratype are not in the best condition, and it is rather surprising to find that the apex of the abdomen is devoid of white scales, but this may be due to the condition of the specimens. The pattern of the wings is very distinctive and renders the species worthy of a description.

#### ANTHRAX CONCISA Macquart.

*Anthrax concisa* Macquart, *Dipt. Exot.*, suppl. 4, 1850, 111; Schiner, *Reise Novara*, Dipt., 1868, 125.—*Argyramoeba concisa*, Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 50.

♂. The head is black; the occiput is black, covered with short, appressed, black hairs and black and white scales, the white scales being more apparent near the hind indentations of the eyes; the ocellar tubercle is prominent, and is crowned with a few erect, black hairs; the face and frons are black, sometimes whitish along the inner eye margins, covered with dense, black hairs; the antennae are entirely black, the third segment usually not as broad at the base as the second; the proboscis is black, with brownish labella.

The thorax is black, covered dorsally with black scales, and black and golden hairs, the latter rather thin, appressed, and more or less confined to the front, and sides above the wing insertions; the hairs in front and on the sides are dense and mostly greyish; the bristles are black; the scutellum is black, covered with black scales, and with appressed, greyish hairs on its margin; the marginal bristles are black; the pleurae are grey dusted, with stiff black, and thin, greyish hairs; the squamae are light brown, with a short fringe of whitish hairs; the halteres are rather elongate, with brownish stems and yellowish knobs, which are black basally.

The abdomen has a band of soft, white hairs on the basal segment, but is otherwise covered with black scales and hairs; the apical segments are clothed with white scales; the hairs on each side of the basal segment are rather dense and white.

The legs are mainly brownish, though the femora appear blackish, and are covered with whitish scales and black hairs; in some specimens the legs are completely brown and are covered with black scales above and white scales below; the pulvilli are brown.

The wings have a broad black basal pattern, the outline of the black area extending from the hind border irregularly to r-m and thence along  $R_{4+5}$ , reaching the fore margin at about one-third of its length from the apex, so that the outline of the black portion appears angulated; the cubital cell may be closed at the wing border or narrowly open; cell  $R_3$  does not possess an interradiial vein; an appendix is sometimes present near the origin of  $R_{2+3}$ .

Length of body, 5-12 mm.; of wing, 6-11.5 mm.

*Hab.*—Q'land: Westwood, Brisbane, Chinchilla, Eidsvold; N.S. Wales: Sydney, Toronto, Wentworth Falls, Kosciusko.

Most of the specimens examined were in a bad condition, and I am unable to decide whether the females also have white scales on the apical segments of the abdomen.



## ANTHRAX ANGULARIS Thomson.

*Anthrax angularis* Thomson; *Eugenies Resa*, Dipt., 1868, 482; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 52.

♂. The head is mainly blackish; the occiput is blackish, dusted with silver-grey and covered with small appressed black hairs; the frons is blackish, grey dusted along the inner eye margins, and clothed with dense erect black hairs; the face is grey dusted, covered with dense, white hairs, which extend along the inner eye margins to the middle of the frons; the antennae are entirely black, the third segment with a long and distinct style, and not as broad at the base as the second segment; the proboscis is black.

The thorax is blackish, with stiff, greyish hairs in front, and black scales and black and grey hairs on the dorsum, the latter appressed, and more dense in front of the scutellum and above the wing insertions; the bristles are black; the scutellum is blackish, covered with black scales and grey hairs, the grey hairs being more conspicuous at the base and along the margin; the bristles are well developed and black; the squamae are whitish with a fringe of white hairs; the halteres are black or brownish, with yellowish knobs; the pleurae are blackish, with white-grey hairs.

The abdomen is black, covered with black and white scales and hairs; thick white hairs cover the basal segment and are continued on each side as dense, white, hairy tufts; on each side of the second segment there is a small area or spot of white scales and hairs; the apex is also covered on each side with white scales and hairs; on the posterior border of the second segment there is a very narrow band of white scales, which does not quite reach the margins, and a further much smaller, median stripe of similar scales on the posterior border of the third segment; the remainder of the dorsum is clothed with black scales and hairs, the latter very dense on the sides of the second to the sixth segments; the venter is black, clothed with white scales and hairs.

The legs are blackish, the femora being covered with white scales.

The wings may be hyaline, with the base and fore margin brown, or the brown may be gradually extended, so that the basal half of the wing, except for most of the axillary lobe and portion of the cubital cell, is all brown;  $R_{2+3}$  possesses an appendix, which may be of various lengths, but never meets the vein  $R_1$ ;  $R_1$  has a distinct loop into cell  $R_4$ , from which there sometimes projects a small appendix; cell  $R_5$  is always open, but the cubital cell may sometimes be closed at the wing border.

Length of body, 8-13 mm.; of wing, 9-14 mm.

The female, as far as I can determine with the material available, is similar.

*Hab.*—Q'land: Pt. Denison, Westwood, Brisbane, Chinchilla, Pt. Curtis; N.S. Wales: Sydney, Piper's Flats, Toronto; W. Australia: Wyndham. There are two specimens labelled South Australia only.

I have before me a series of sixteen specimens, in which a gradual extension of the brown area of the wing can be traced. Seven of the series have only the base and fore margin brown; three, the basal half almost completely brown; and the remaining six have the brown area showing a more or less gradual increase which eventually ends in the broad basal pattern.

## ANTHRAX INCISA Macquart.

*Anthrax incisa* Macquart, *Dipt. Exot.*, suppl. 2, 1847, 52; White, *Proc. Roy. Soc. Tasm.*, 1916, 207; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 51.

♂. The head is black; the occiput is black, covered with appressed, black hairs and white scales, the latter more conspicuous near the hind indentations of the eyes; the face and frons are both blackish, clothed with dense, black hairs, and some whitish scales, which extend up the frons for one-half its length; the antennae are entirely black, the third segment not as broad at the base as the second; the proboscis is black; the eyes possess a well marked indentation of the hind borders and a distinct bisecting line.

The thorax is blackish, with stiff greyish hairs in front; on the sides the hairs are greyish, intermingled with which are numerous brown or golden hairs; the dorsum is covered with black scales and hairs, with some appressed golden pile in front; the bristles are black; the scutellum is black, covered with black scales, and with a little golden pile on the margin; the bristles are rather weak and black; the squamae are whitish with a fringe of whitish or brownish hairs; the halteres are light brown with whitish knobs.

The abdomen is black, with narrow brown posterior borders to the segments; the tomentum is mainly black, with brown hairs on the posterior borders of each segment, and a band of white hairs on the first; the apex is clothed with brown or white scales; on each side of the basal segment is a tuft of white or brownish hairs; the venter is brown, or black-brown, covered with brown scales and black hairs.

The legs are brown, with somewhat darker tibiae and tarsi, and covered with brown or white scales and brown hairs; the pulvilli are brown.

The wings have a broad black basal pattern, the outline of which is very irregular, and near the fore margin it descends as a dilation from cell  $R_1$  into cell  $R_5$ ; an appendix is present near the origin of  $R_{2+3}$ , but it never attains the vein  $R_1$ ; the cubital cell is closed.

As far as an examination of the series will permit, I can distinguish no difference in the female.

Length of body, 4-10 mm.; of wing, 5-10.5 mm.

*Hab.*—Q'land: Eidsvold, Brisbane, Chinchilla; N.S. Wales: Sydney, Casino; S. Australia: Adelaide.

There are ten specimens of this species in the series under examination. They are mostly old specimens in a rather rubbed condition, and it has been hard to determine the extent of the white scales on the abdomen. In some of the series the pubescence is quite brown, even the scales on the apex of the abdomen, and I have been unable to decide whether this condition is due to age, though it probably is. The peculiar black pattern of the wings may be relied on, however, as a reliable character.

#### ANTHRAX INCOMPTA Walker.

*Anthrax incompta* Walker, *List Dipt. Brit. Mus.*, ii, 1849, 253.—*Argyramoeba incompta* Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 50.—*Anthrax semimacula* Walker, *List Dipt. Brit. Mus.*, ii, 1849, 254; Hardy, *Proc. Roy. Soc. Tasm.*, 1921, 51.

The head is black; the occiput is black, covered with appressed, black hairs and white scales; the face and frons are both black, clothed with dense, black hairs and white scales, which extend from the face half-way up the frons; the antennae are black, the basal portion of the third segment broader than the second; the apical pencil of hairs is very distinct; the proboscis is black; the eyes have a well marked indentation of the hind borders and a distinct bisecting line.

The thorax is blackish, clothed in front and on the sides with grey hairs, with which are mingled a few black hairs; the dorsum is clothed with grey appressed and erect black hairs; in front and on the sides there are some golden appressed hairs; the bristles are black; the scutellum is black-brown with black scales and some appressed grey pile on its margin; the bristles are well developed and black; the pleurae are somewhat blackish, with soft grey and stiff black hairs; the squamae are whitish with a fringe of white hairs; the halteres are brownish with whitish knobs.

The abdomen is black, with white scales on the posterior borders of the second, third and fourth segments, the scales forming bands or horizontal stripes of varying lengths; the penultimate and ultimate segments are covered on each side with a tuft of white scales and hairs; the remainder of the dorsum, except for the basal segment, which is clothed with dense white pile, is covered with black scales and hairs; the lateral pubescence consists of a dense white basal tuft, followed by dense black hairs, which extend to the white scales on the apical segments.

The legs are mainly blackish, with the middle and fore tibiae brownish; they are covered with black scales and hairs.

The wings have a broad black basal pattern, the outline of which is very irregular, and around the vein r-m it is dilated into an almost isolated spot; the brown portion includes some lighter areas or spots; the hyaline part contains two, three or four, generally four, brown spots, placed on various crossveins and bifurcations; the vein  $R_1$  is greatly looped into cell  $R_1$ , and is usually provided with a short appendix near its origin with  $R_{4+5}$ ; the cubital cell is narrowly open or closed at the wing border.

The female is similar, though apparently generally larger than the male.

Length of body, 4.5-10 mm.; of wing, 4.9-5 mm.

*Hab.*—Q'land: Cape York, Somerset, Brisbane, Chinchilla, Westwood; W. Australia: Perth, Geraldton. There are specimens in the Macleay Museum from New South Wales and South Australia. There are also two specimens in the Australian Museum, which were obtained from an exhibit which was sent from the Bismarck Archipelago.

I have recorded *semimacula* Walker as a synonym of *incompta*. There are two very old specimens in the series examined, in which the pubescence is mainly brown or golden, and the description of *semimacula* more or less agrees with these two specimens.

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